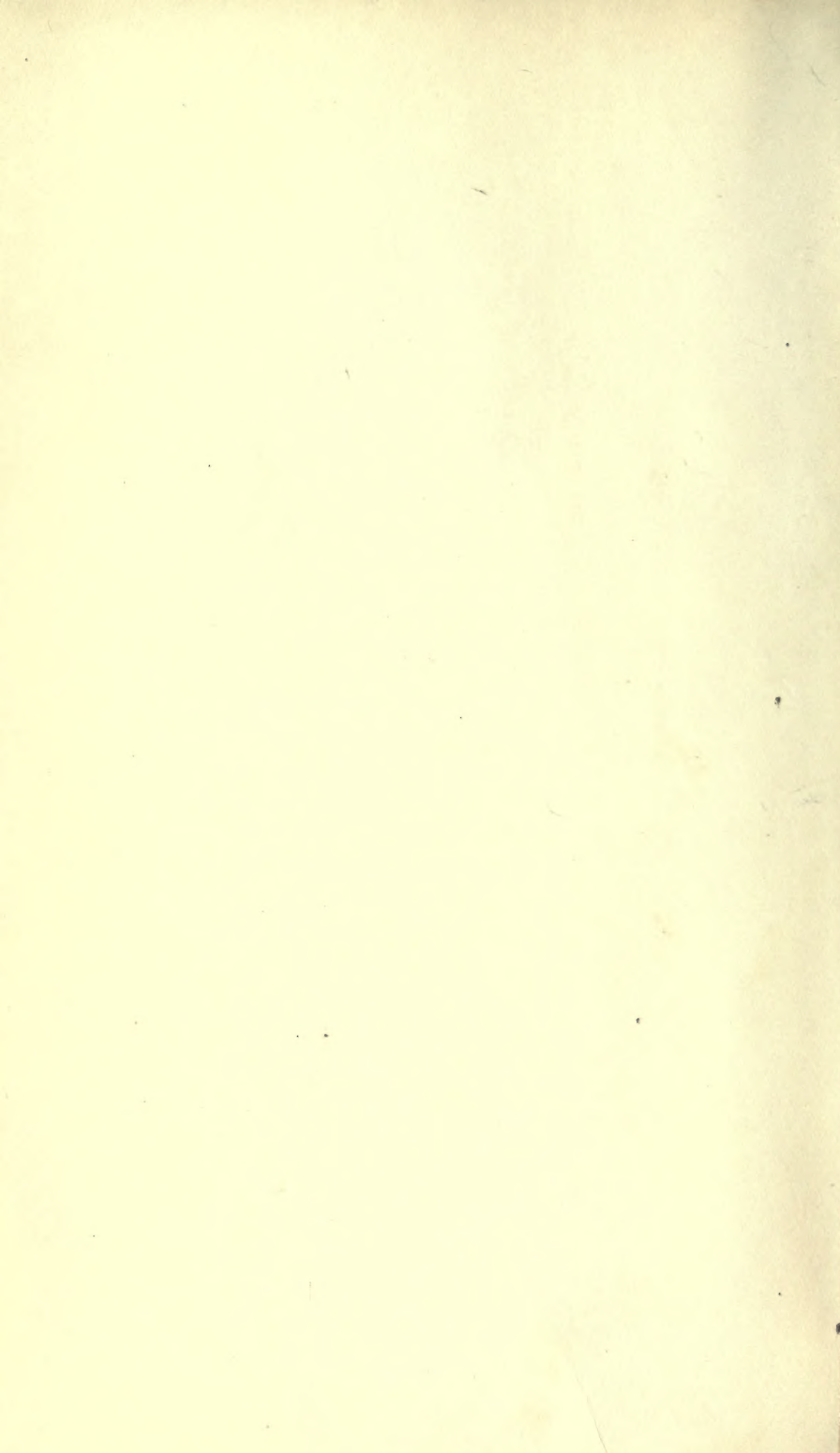




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EDITED BY JOHN T. CARRINGTON, F.L.S.

WITH THE ASSISTANCE OF

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F.L.S. F.E.S.

"By mutual confidence and mutual aid
Great deeds are done and great discoveries made."

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"The soul and Nature are attuned together. Nature breathes nothing unkind. expands, or calms, or softens us."—Channing.

**"When I Nature's wise instruction seek,
With light of power my soul shall glow."
—Goethe.**

"To the attentive eye, each moment of the year has its own beauty. The tribes of birds and insects, like the plants, punctual to their time, follow each other, and the year has room for all.—R. W. Emerson.

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ON THE VARIATION OF INSECTS.

By T. D. A. COCKERELL.

At all times, and more especially of late years, the various deviations from the type-form presented by insects have excited considerable interest in the minds of entomologists; and, as a result of this, scarcely a number of an entomological magazine can be found which does not contain some reference to varietal forms. Nevertheless, the attempts to classify these numerous varieties have been very few, the most notable that I can recall being that of Mr. Jenner Weir in the 'Entomologist' (Entom. xii. 153), while little or nothing has been done towards ascertaining the causes of variation, or even recording the obvious accompanying circumstances.

The present paper is intended rather as an indication of the manner in which varieties may be classified than any final arrangement of them, and seeks to stimulate such interest in the matter that its suggestions may be put to the proof, and confirmed or discarded in favour of better ones. The varietal names used are, as far as possible, in accordance with the "Code of varietal nomenclature," already proposed in the 'Entomologist,' but many forms have had names applied to them by authors which are not the most convenient. These, in obedience to the law of priority, have been retained.

Class I.—COLOUR VARIETIES.

a. *Intensification of Colour.*

Examples.—*Pieris rapæ*, var. *novangliæ*, Scudd., and var. *manni*, Mayer. *Vanessa huntera*, var., with the (typically white) spot on the inner side of the black patch on the apex of the primaries yellowish (Maynard). *Bryophila perla-flavescens*, Entom. xx. 240; also "an orange variety," Proc. S. Lond. Ent.

Soc., 1886, 59; and "xanthic forms," *tom. cit.*, 63. *Arctia villica angelica*, B., *vide* Staudinger Catl.—In these examples yellow takes the place of white. No evidence is forthcoming as to the precise conditions under which this occurs, except that the yellow varieties of *Pieris rapæ* are said to be much more frequent in America than in Europe, and therefore probably the result of a different climate from that to which the species has always been accustomed in Europe, its native country. Much light, however, is thrown upon the probable nature of the change by the observation of Mr. Coverdale, repeated by numerous subsequent observers, that the white pigment of several species of Lepidoptera may be changed to yellow by the application of a caustic alkali.

Abraxas grossulariata lutea, Entom. xx. 278, is probably due to an extension of the normal yellow markings.

Arctia villica fulminans, Stgr.; locality, Syria.—This is the only instance I have of the change of the yellow pigment into red, and in this case there is always some indication of red about the typical form. The opposite case, that of a red pigment changing to yellow, is, as I have shown in a previous paper, by no means uncommon; nor is it confined to insects, being also witnessed in birds (Fringillidæ), mollusca (Tellinidæ), &c. Two other cases of change of colour may be mentioned here, as requiring further investigation,—*Ino statice manni*, Ld., and *Noctua subrosea subcærulea*, Stgr., the last, from Livonia and Finland, being rather a geographical race. An extraordinary variety of *Arge galathea* is also on record (Entom. xvi. 210), in which reddish and greenish take the place of black and white.

The above varieties differ notably from suffused, melanic, and other forms, in that they have their origin in a change in the nature of a pigment equally prominent in the type form, and not in the excessive development of an unaltered colour, as is the case with the following.

Hepialus humuli subrosea, ♂, Ent. Mo. Mag., 1881, 111.—Mr. Barrett, in describing this form, says the apical-third of the silvery white fore wings was distinctly tinged with a delicate pink (an extension of the pink of the apical cilia), which fades after death. This pink colour is evidently what Dr. Hagen (Ent. Mo. Mag., 1872, 78-83) described as hypodermal, the colours of this class being mostly bright and light, and fading after death of the insect. These hypodermal colours are supposed by Hagen to be produced by a photographic process, while the darker or sometimes metallic epidermal colours are due to a process of oxidation, and never fade after death.

It is strangely contradictory of this theory, however, that Mr. P. R. Uhler found by experiment that in specimens of the Heteropteron *Murgantia histrionica*, Hahn., those reared in the

dark showed a predominance of the pale red parts, while in those reared in bright daylight the dark blue colour predominated. (Rept. of U. S. Com. Agric., 1884, 309.*)

b. Metallic colours.

Anchocelis pistacina metallica; near Caterham, Entom. xi. 21.—This remarkable aberration was described as having on each fore wing a large patch of metallic cast, thus simulating the condition that is normal with some species of *Plusia*.

Colias edusa purpurascens, Entom. xi. 51.—Mr. E. A. Fitch, writing of this species, describes an aberration "beautifully shot with purple or blue," a condition which is quite normal in other species of *Rhopalocera*, notably some species of *Chrysophanus*.

c. The development of green pigment.

Venilia maculata viridimaculata, Entom. xi. 103. *Lasiocampa quercus olivaceofasciata*, Entom. xi. 103.—The change of the black markings to olive-green in the *Venilia* was accompanied by their partial coalescence. We know that the green pigment in *Geometra papilionaria* is first brown, and in *Pseudoterpna cytisaria* the final change to green frequently does not occur, producing the well-known brownish form of the species. It appears, therefore, probable that the above cases of *Venilia* and *Lasiocampa* represent the excessive metabolism of pigments which normally only attain the brown and black stages.

d. Bleached and albino forms.

Epinephele tithonus albidus, Entom. xi. 101. *Chrysophanus phloxas schmidtii*, Gerh. *Eusebia bipunctaria albida*, Entom. xvi. 170. *Hepialus humuli*, ♂, type.—In these cases white takes the place of another colour, and they are in no sense analogous to the white spotless varieties of *Abraxas*, &c. I am strongly inclined to suppose that the male type of *H. humuli* had its origin in a variety similar in character to the other three enumerated, and I accordingly class it with them.†

Epinephele ianira hispulla, Hüb., Entom. xi. 1; near Dover, &c. *E. tithonus pallescens*, Entom. xi. 229; xvi. 234; xix. 230. *Oporabia dilutata pallescens*, Newman, 'Brit. Moths,' 108. *Lycena corydon albicans*, H.-S. *Melitæa aurinia sibirica*, Stgr. *Danaïs chrysippus alcippus*, Fab., "al. post.

* I am inclined to think that this experiment throws light on the reason that the hind wings of Noctuæ, which are under the fore wings, are nearly always pale, while those of *Rhopalocera* and *Geometræ* are generally concolorous with the fore wings.

† In the Mollusca I have shown that albinism, from being excessively rare and aberrational, may become common and even normal, though of course in hermaphrodite species it cannot become peculiar to a sex. Vide "The Variation and Abnormal Development of the Mollusca," in 'Science Gossip,' 1886.

albidis." *Nemeophila plantaginis hospita*, Schiff., "al. post. albis, nigro-maculatis." *Agrotis ripæ weissenbornii*, Fr. *Triphæna comes pallescens*, hind wings creamy white, Entom. xx. 240. *Coccinella septempunctata pallida*, pale yellow, Entom. xx. 237.—This appears to be rather a miscellaneous collection of varieties, but the information obtainable concerning them is not sufficient to class them more precisely at present. The pallid forms of *Epinephele* seem to be due simply to the non-development of brown pigment, whereas the pale *Coccinella* has almost certainly a different origin in arrest of development of the usually red pigment at its yellow stage, like the brown variety of *Pseudoterpna*. The var. *albicans* of *Lycæna corydon* might almost be called an albino. Mr. A. H. Swinton (Ent. Mo. Mag., 1885, 231) speaks of white *L. corydon* occurring on limestone plains in Spain, which is interesting as tending to confirm the theory that albinisms are of unusual frequency on limestone soil. In this connection it may be mentioned that Wollaston found that *Bembidium atlanticum*, Woll., was dark in Madeira, but much paler in Porto Santo, which is much more calcareous, and is strongly impregnated with muriate of soda.

e. *Dimorphism: light and dark forms.*

Heliothis peltigera pallida, Entom. xi. 24. *H. armigera*, a. *fusca* (Entom. xi. 24); b. *ochracea* (4th. Rept. U.S. Ent. Com., 1885, pl. iii., fig. 7); c. *umbrosa*, Grote, sp. *Tæniocampa gracilis rufescens*, Proc. S. Lond. Ent. Soc., 1886, 34, 35.—These are given as examples, but it is well known that many genera of brownish Noctuæ present light and dark varieties, which are often more or less local in their distribution; and a similar phenomenon obtains in certain Coleoptera, such as *Meligethes rufipes rufescens* (Ent. Mo. Mag., 1885, 217).

Limenitis disippus floridensis, Strecker, ground colour very dark. *L. arthemis rufescens*, reddish brown above as well as below (Maynard).—The first of these is a southern form in the United States, and it is worthy of note that there also occurs in the Southern States a distinct species, resembling the southern variety of *L. disippus* in its normal colour, but differing somewhat in the markings.

Hydroecia nictitans; a. *typica*; b. *erythrostigma*, Haw. *Anomis texana*, Riley; a. *fuscostigma* (4th Rept. U. S. Ent. Com., pl. ii., fig. 6); b. *albastigma* (*loc. cit.*, fig. 6a).—The dimorphism in the colour of the stigma in *H. nictitans* is familiar to every British entomologist; it is, therefore, interesting to find a closely analogous case in a moth from Texas.

f. *Dimorphism confined to one sex.*

Colias edusa helice, ♀, Hb. *C. helice pallida*, ♀, Entom. xi. 51. *C. erate pallida*, ♀, Stgr. *C. aurora chloë*, ♀, Ev.

C. eurytheme pallida, ♀, Ckll. *C. philodice alba*, ♀, auctt. sp. Maynard. *C. electra pallida*, ♀, Grahamstown, Proc. S. Lond. Ent. Soc., 1886, 60. *Papilio turnus glaucus*, ♀, L. *Pamphila zabulon pocahontas*, ♀, Scudd. *Callidryas sennæ pallida*, ♀; dirty whitish yellow (French, 'Butt. of E. N. Amer.').—These are all dimorphic female forms, and I think, however looked at, their interest cannot be exaggerated. The first question that arises is, Are they atavisms? Do they represent the primitive condition of the species? This at first sight appears not very improbable, but I think we may answer it in the negative. It is not altogether impossible that reversion to the type should be confined to the female, yet it is, I imagine, somewhat unlikely; but what seems to weigh most against the theory of atavism is, that certain species of *Papilio* are trimorphic in the female sex, and these, at any rate, obviously cannot be explained by atavism.

Now we have seen above, under "light and dark forms," that some measure of dimorphism may obtain apparently without the slightest reference to sex, climate, or food, of which *Hydræcia* and *Anomis* are good examples; and we shall see below that characters peculiar to the one sex, occasionally appear in the other; that is to say, one sex, in very rare instances, presents a dimorphic form similar to that which is normal with the other. Suppose, then, a "spontaneous" (that is to say, without reference to general external circumstances) variation to occur, as it is I think certain that they do occur, is it unreasonable to suppose that it might become, either from sexual selection or from physiological causes, more prevalent in the one sex than the other? Further, might it not gradually become peculiar to the sex, until it was the normal condition? This seems to me the explanation of secondary sexual characters in the Lepidoptera, if not in all other organisms; and I regard the pale females of *Colias* and *Callidryas sennæ*, and the dark female of *Papilio turnus*, as fore-runners of what is in the future to be the typical female of each respective species. In one case at least, this final process can be traced. The male of *Callidryas sennæ* is clear lemon-yellow, while the female is either of the same colour as the male, or of a dirty whitish yellow colour. In *C. agarithe*, the male is clear light orange, while the orange form of the female having apparently become extinct, the typical colour of that sex is dirty whitish yellow, like the dimorphism of *C. sennæ*.

Lycæna pseudargiolus (violacea) nigra, ♂, Edw. *Lycæna bellargus nigra*, ♂, Proc. S. Lond. Ent. Soc., 1886, 61.—These are cases of dimorphism in the male, a rare condition. Maynard states that black females of *L. pseudargiolus* are occasionally found, so this condition would seem not to be strictly peculiar to the one sex.

g. *A combination of two forms in one insect.*

Lycæna ægon duplex, "a specimen having the right-hand wings plain brown, and those on the left-hand blue; at first sight it had the appearance of an hermaphrodite, but was, in reality, a female combining the two forms of that sex." Exhib. by Mr. Bond at Ent. Soc. (Ent. Mo. Mag., 1873, 200). *Colias edusa duplex*, upper wings like *helice*, lower typical; or left side typical, and right *helice* (Entom. xi. 52, and August, 1876). *Meligethes rufipes duplex*. Thorax and one elytron typical, the other elytron reddish (Ent. Mo. Mag., 1885, 217).—It seems excessively strange that two forms should ever be combined in the same insect in this manner, yet the very ordinary phenomenon of the upper wings differing from the lower is, in some degree, analogous. And further, a character normally peculiar to one set, may become also abnormally developed on the other* (see for instance the variety of *Leucania conigera*, with the left lower wing marked like the typical upper wings (Entom. xi. 169, and col. fig.). Now supposing this very rare aberration were in any case to become frequent and at length typical, say by the development on all four wings of the spots formally confined to the upper, a specimen reverting to the ancestral type would be in many respects similar to the specimens mentioned above, and entirely so if there existed at the same time a spotless variety.

Looking at the question from this point of view, it even seems remarkable that no permanent variety has been developed in which the right side differed from the left, but doubtless the laws of correlation have prevented this. Mr. S. Webb, however, gave me some very interesting statistics concerning species of *Lycæna* and *Epinephela* in his collection, tending to show that a perfect similarity of the opposite wings was the exception rather than the rule; and my own observations on *E. hyperanthes* lead me to believe that the ocelli are, on the average, better developed on one side than the other; but until I have examined a larger amount of material I cannot say definitely. I am sure all entomologists would be much indebted to those who have long series of this insect, and of other spotted or ocellated forms, if they would work out this matter and publish their results.

* Characters peculiar to one side may also be developed on the other; for example, *Epinephela hyperanthes*, with ocelli developed on the upper side (Entom. xix. 71).

(To be continued.)

[At the request of Mr. Cockerell, the trinomial system of nomenclature is used in this article.—ED.]

THE INFLUENCE OF METEOROLOGICAL CONDITIONS UPON INSECT LIFE.

BY ROBERT ADKIN, F.E.S.

MR. WHITE suggests, in his notes on this subject (Entom. vol. xxi. p. 217), that the influence of irregular or intermittent temperature upon the emergence of insects has received less attention than it deserves. No doubt this is so, and probably one great reason for such being the case is the difficulty of obtaining reliable data to work upon. Accurate meteorological records, it is true, are accessible in a conveniently tabulated form for reference, not only temperatures, but also the amount of sunshine, rainfall and other matters calculated to affect insect development being given in detail. But can we place equal reliance upon our entomological observations? Are there not many other conditions, besides those meteorological, that may escape our observation and yet have an important bearing upon the question?

Notes of emergence in our breeding-cages, for instance, appear to me likely to be particularly misleading. The conditions under which insects are so kept, are to a greater or less extent artificial. This is especially so in the case of subterranean pupæ. In nature these are surrounded by a considerable body of earth, which serves as a natural protection against rapid changes of temperature, whereas under the artificial conditions of the usual breeding-cage they have at best but a few square inches of soil around them. Further, given, as is frequently the case, that this soil is contained in a porous earthen pan, which from any cause has become moistened, it is probable that a refrigeratory action would be set up by evaporation, which would create an abnormally low temperature in the interior of the vessel containing the pupæ, possibly resulting in late emergences from purely artificial causes. As an example I will give the following tabulated statement of the behaviour of three consecutive broods of *Ptilophora plumigera*, a species that performs the whole of its metamorphoses during what are usually the warmer months of the year. They were reared under as nearly as possible similar conditions; the cages containing them being kept in a well-lighted outhouse, fully exposed to the air, but sheltered from rain:—

	1886.	1887.	1888.
Ova hatched	April 26.	April 21.	May 6.
Larvæ full-fed	May 28.	June 9.	June 10.
First imago emerged...	Oct. 9.	Nov. 9.	Oct. 26.
Chief emergence	Oct. 24.	Nov. 26.	Nov. 3.
Last emergence	Nov. 21.	Dec. 3.	Nov. 11.

Assuming for the sake of argument that warm seasons induce early emergences, we should expect to find the appearance of

imagines in the past admittedly cold season later than in the former years, whereas it is considerably earlier than after the warm summer of 1887, and in the average but little later than in 1886. On the whole such data appear to me calculated to mislead, and should be accepted, if at all, with great caution.

Field notes are not open to the same objections. Carefully recorded observations of the appearance of many species under their natural conditions should be of considerable value in elucidating the question, and not difficult to obtain from those who are able to make frequent notes in a locality at stated periods. Species that usually occur in considerable numbers should be the best for observation, and comparison between the times of appearance of the same species in different localities must not be taken to indicate an earlier or later general emergence. I may perhaps best illustrate my meaning in regard to this suggestion with notes extracted from my diary, of the appearance of the second brood of *Lycæna bellargus*, for the years 1887 and 1888. The first note I have in 1887 is that it was taken at an inland locality on August 8th, by a friend with whom I was in frequent communication. At this date I was staying on the Sussex coast and daily expecting to meet with the species, but it did not appear until the 28th of the month. This year I was on the same coast-ground throughout the month of August and until September 12th; a sharp look-out was kept during the whole time, but up to the last date not a specimen was to be seen. It cannot be supposed that the brood was this year completely suppressed; and although the record is incomplete by reason of the species not being found, it appears to be clear that in this one locality it was at least fifteen days later than in 1887, but it would be manifestly unfair to draw a comparison between the inland and coast localities. Insects that have a rapid succession of broods are difficult to deal with, as there is with them the possibility of the end of one brood so overlapping the commencement of another as to render comparison untrustworthy.

Mr. Griffiths's note (Entom. vol. xxi. p. 283) affords me an opportunity of illustrating the difficulty of dealing with successively-brooded species. Is he right in assuming that the capture of "three fresh specimens" of *Tephrosia crepuscularia* on July 5th is indicative of a comparatively late emergence? There is, I believe, no doubt as to the double-broodedness of this species, the first brood appearing in March and April, the second at the end of June and early in July. Is it not then quite as likely that these specimens should be referred to the second as the first brood? and in that case their time of appearance would be normal.

The difficulties in the way of working out so interesting a

subject should not, however, be insurmountable; and there ought to be, with some little care in the selection of suitable observations, a sufficiency of reliable data forthcoming to enable Mr. White to prosecute his task to a successful conclusion.

Lewisham, December, 1888.

CONTRIBUTIONS TOWARDS A LIST OF THE VARIETIES OF NOCTUÆ OCCURRING IN THE BRITISH ISLANDS.

BY J. W. TUTT, F.E.S.

(Continued from vol. xxi., p. 313.)

Axylia, Hb., *putris*, L.

The type of this species is described by Linnæus as:—"Noctua spirilinguis cristata, alis deflexis obsoletis subpunctatis, margine exteriore fusco adjecta macula subocellari." "Color ligni putride, ut in exsoleta s. verbasci, sed brevis." ('Systema Naturæ,' p. 850, No. 152). Haworth describes the species as, "Alæ pallidæ sive flavicantes costâ late fuscâ," &c. ('Lepidoptera Britannica,' p. 172, No. 34); and Guenée, again, describes it as, "Superior wings of a very clear, pale yellow, with the costa broadly brown," &c. ('Noctuelles,' vol. v. p. 134). Hübner figures the species under the name of *lignosa*, and his figure (245, by error 215) is not quite typical, the anterior wings being "yellowish ochreous with black markings." Newman, in his 'British Moths,' p. 282, describes the species as "pale wainscot-brown with dark umber-brown markings." These seem to be the chief points of variation, *viz.*, the ground colour varying from whitish or pale yellowish to dark ochreous or wainscot-brown, and the markings from brown to black. I have both forms in my cabinet. Those with typical pale yellow wings and black markings would appear to be the *sicca* of Guenée. Mr. Russ has sent me a specimen from Sligo with a distinct dark shade, reaching from the base of the reniform to the inner margin.

α. var. lignosa, Hb.—Ground colour yellowish-ochreous instead of pale yellow or whitish; the ordinary markings black instead of brown, much irrorated with fuscous dots. A full description of Hübner's *lignosa* would be, "Anterior wings with the ground colour of a yellow ochreous shade, with a black basal streak, the orbicular and reniform outlined in black; a double transverse line of dots beyond the reniform; the median nervure continued through the wings as a dusky shade; a broad black costal streak runs along from the base of the costa to the apex where it ends; two short dusky shades are placed in the upper part of the outer margin. Hind wings grey, with the outer margin slightly ochreous." Newman's figure, 'British Moths,' p. 282, is much too dark for the type, and apparently belongs to this variety.

(?) *β. var. sicca*, Gn.—Guenée describes a species under the name of *sicca* as follows;—"A little smaller than *putris*, the superior wings of which

species those of *sicca* much resemble, if it were not that the costal streak is more black than brown, above all between the two stigmata, where they form a distinct black spot. Inferior wings entirely pure white. Head, thorax and palpi pale yellow. I have only a single male of which I am ignorant of its locality " ('Noctuelles,' vol. v. p. 135). The pure white hind wings leave me in doubt as to the specimen being a variety of this species.

Xylophasia, St., *sublustris*, Esp.

This species has been much mixed up with *lithoxylea*, many of our early authors treating them as the same species. Hübner figures (240) a red variety of *sublustris*, which he calls *lithoxylea*; and Haworth, in his 'Lepidoptera Britannica,' p. 169, No. 25, writes with reference to this figure, comparing it with *lithoxylea*, "at magis ferruginea"; but as he does not attempt to separate it from *lithoxylea*, British *sublustris* may not have been known to him. Guenée, in his 'Noctuelles,' vol. v. p. 139, states that "Treitschke has confounded the two species, and has cited their synonymy very indistinctly." On p. 140 Guenée also writes, "Is this a separate species, or only a variety of *lithoxylea*? . . . It is constant in markings and character." He then writes:—"Its colour is always more red, and the discoidal spots much better marked; the inferior wings have a very distinct brown discoidal line between the lunule and the hind margin." These characters are distinct, and I think the difference in the hind wings of *lithoxylea* and *sublustris* well worthy of notice.

This interesting species is very variable on the coast of Kent, and specimens exhibit much difference both in the ground colour and the depth of the markings. Most of the specimens have the anterior wings of a pale ochreous-grey ground colour; others are decidedly yellowish ochreous, and these lead up to a very distinct form with the ground colour decidedly tinged with red. With respect to the markings, there is also a very great difference. Some specimens have the characteristic markings in the central part of the wing and on the outer margin very faint, and merging into the ground colour; others have them distinctly marked in dark greyish brown; others have them marked in deep brown; while the form mentioned above, with the red ground colour, has them in a clear reddish brown or rust-red, shaded off into the paler ground colour. The specimens also vary with regard to the transverse row of spots parallel to the hind margin; some specimens have these spots absent, some well developed, and some have them joined by curved arches, making a wavy line exactly of the same character and shape as the second transverse line in the allied species *polyodon*, L. (*monoglypha*, Hufn.). But the most remarkable specimen I have is one with the whitish ground colour of *lithoxylea*, with all the markings of *sublustris* most clearly developed, even to the wavy line mentioned above. There is a great amount of difference also in the quantity of dark scales

with which the anterior wings are sprinkled. This makes some specimens look quite melanic compared with others. But dark as some of our specimens are, we do not appear to obtain (after making all due allowance for the artistic demerit) any specimens so dark as Esper's type. Esper's fig. 1 ('Die Schmetterlinge,' &c., pl. cxxxiii.) is the type, and, although bad enough, is recognisable at once as an exceedingly suffused form of this species. I have made the following description of his figure:—

“Probably a female (Esper calls it a male). Anterior wings dark ochreous, entirely suffused for two-thirds of the wing from the base with dark fuscous, except along the inner margin, where the ground colour is more noticeable; the outer one-third of the wing, from the apex to the inner margin, paler; this paler area with a double transverse row of dots parallel to the hind margin, and also a pair of dots near the edge of the inner margin at about one-third from the base;* the nervures with a slight purplish tinge; the hind margin dark fuscous. The hind wings dark grey, the base a little paler, with a slight purplish tinge.”

It will at once strike those who have a short series from our south coast how unlike this description is to our usual forms; and yet when one looks at Esper's figure one recognises at once that it is *sublustris*. I have only seen one Irish specimen, and that is quite as dark as, perhaps a little darker than, the darkest I have from Deal. Besides this very dark type, we in Britain appear to get two very distinct forms, which are comparatively rare, these extremes being joined by intermediate specimens, which vary much, *inter se*, both in the depth of the ground colour and markings, although of a general greyish ochreous hue. These forms I shall call:—

α. var. pallida, mihi.—Ground colour whitish-ochreous, inclining to the pale colour of *lithoxylea*, the dark shades very distinct and standing out clear in the pale ground colour; the transverse markings very distinct, a transverse wavy line being formed by the union of the transverse row of dots parallel to the hind margin, with lunular arches. Hind wings dark grey, with a distinct lunule, a pale transverse line outside the lunule, then a dark transverse shade followed by another pale marginal line. I have only occasionally captured specimens of this variety at Deal.

β. var. intermedia, mihi.—Intermediate between var. *pallida* and the red var. *lithoxylea* of Hübner. Ground colour yellowish-ochreous, with a dark grey tinge, the typical shades variable in depth of colour, and the transverse lines also variable in the extent of their development. This is the ordinary British form.

γ. var. lithoxylea, Hb.—This must not be confounded with the *lithoxylea* of Fab., which is a distinct species. Hübner's fig. 240 may be described as follows:—“Anterior wings bright ochreous with a reddish tinge, a bright red shade between the stigmata, and another bright red shade along the

* These two dots are very unusual in *sublustris*, although common in *lithoxylea*. I have one specimen of *sublustris* with both developed, many with one, but the greater number of my long series have neither.

hind margin; a series of black dots on the pale nervures beyond the reniform area. Hind margin of the hind wings dark ochreous, with a dark transverse shade and lunule." This is a very distinct form, with the ground colour redder than the type, and the ordinary dark shades of the type of a distinctly bright rust-red colour. I have looked over and captured a large number of this species at Deal, but this form must be considered rare there, as I have taken but few of them. I have seen odd specimens amongst those taken by the Folkestone collectors, and I dare say a larger number would occur there, as the species is very abundant.

Xylophasia, St., *lithoxylea*, F.

So much uncertainty prevails with regard to the *lithoxylea* of the 'Vienna Catalogue,' which gives no description, that the *lithoxylea* of Fabricius ('Mantissa,' p. 182) is generally accepted as the type of the species. This description is as follows:—"Noctua cristata alis deflexis dentatis, cinereis fusco maculatis; margine postico fusco." "Corpus cinereum. Thorax dorsali brunnea. Alæ anticæ dentatæ cinereæ maculis punctisque obsoletis fuscis. Margo posticus tenuissime fuscus. Subtus cinereæ margine tenuiori nitido. Posticæ cinereæ margine postico fusco, subtus immaculatæ."

Hübner figures the very red form of *sublustris* as *lithoxylea*. It is a species which varies but little, so far as I know; some specimens appear to be a little more suffused with dark scales than others, but generally the paler specimens show undoubted traces of wear. The specimens which I have from Greenwich, Strood, Deal, Sligo, and northern British localities, show no variation worth mentioning. Haworth, in his 'Lepidoptera Britannica,' p. 169, gives a good description of this species; but he accepts Hübner's fig. 240 as this species, with the remark "at magis ferruginea," although it is undoubtedly *sublustris*. Guenée also states in his 'Noctuelles,' vol. v. p. 139, that "some lepidopterists have supposed *lithoxylea* a variety of *polyodon*." This will give some idea of the closely-allied character of this group when studied through their varieties.

(To be continued.)

THE INSECT FAUNA OF ST. KILDA.

BY C. W. DALE, F.E.S.

At the September meeting of the Entomological Society, Dr. Sharp recorded a list of nine species of Coleoptera from St. Kilda. To that list I can add seven others.

The Coleoptera of the Isle now consist of:—*Elaphrus lapponicus*, *E. cupreus*, *E. uliginosus*, *Carabus catenulatus*, *C. granulatus*, *Nebria brevicollis*, *N. gyllenhalii*, *Calathus*

cisteloides, *C. fuscus*, *C. mollis*, *Pristonychus terricola*, *Pterostichus nigrita*, *P. niger*, *Amara aulica*, *A. communis*, *Ocypus olens*, *Byrrhus æneus*, and *Geotrupes sylvatica*.

The Lepidoptera are:—*Cænonympha pamphilus* (the only butterfly), *Anaitis plagiata*, *Crambus culmellus*, *Bactra lanceolana*, and *Glyphipteryx cladiella*.

The Trichoptera are:—*Limnophilus auricula*, *Polycentropus irroratus*, and *Beræa pygmæa*.

The Diptera are:—*Microphorus crassipes*, *Dolichopus atratus*, and *D. nubilis*.

The Hemiptera are:—*Lygus pratensis* and *Athysanus obscurellus*.

The Orthoptera are represented by only *Forficula auricularia*.

I can fully endorse Dr. Sharp's remarks of the specimens showing no signs of depauperation, and being scarcely distinguishable from ordinary English specimens.

My information comes from an account of the Isle of St. Kilda, by John Macgillivray, 1840; and also from a visit paid there by myself on July 28th, 1883. St. Kilda is the most westerly of the Hebrides, and is situated far out in the bosom of the broad Atlantic, eighty miles west of the Butt of the Lewis, and belongs to Macleod of Macleod. The isle is very bare, being closely fed down with sheep and cattle, and I did not find a single bramble. The cliffs are of stupendous height; one of them, Conacha, is about 1300 feet high. There are about seventy or eighty inhabitants. An immense number of sea-birds make it their head-quarters, such as solan geese, fulmar petrels, puffins, &c. In 'The Zoologist' for 1886, p. 333, is an account of a new species of wren. I saw it when there, but did not know it was different from the common one. Amongst plants I observed the corn-marigold, primrose, bog-pimpernel, and cotton-rush.

Glanvilles Wootton, Sherborn, Dorset, Nov. 5, 1888.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

COLIAS EDUSA var.—Mr. J. Anderson, jun. (Entom. xxi. 272), speaks of a "primrose-coloured" *Colias edusa* var. *helice* in Sussex. It is true that *helice* is not an albino, but it is not of the vivid yellow characteristic of a well-coloured primrose. Will Mr. Anderson give a fuller description of this insect? for if it proves to be a yellow var. of *C. edusa*, comparable to the var. *eriphyle* of the American *C. eurytheme* (see Entom. xxi. 189), I need hardly say, that its interest and value from a biological point of view is very great.—T. D. A. COCKERELL; West Cliff, Colorado, November 27, 1888.

VANESSA URTICÆ var.—On the 16th of October last my mother caught at Exmouth, S. Devon, a specimen of *Vanessa urticæ* which strongly resembles the first variety figured in Newman's 'British Butterflies.' The insect is

rather smaller than the type, and the two black spots in the centre of the anterior wings are very indistinct, the upper one being very nearly invisible, and the lower one much smaller than in the typical form: the black spot on the inner margin of the fore wings is also smaller than in the type. I have also a specimen of this insect in which the right hind wing is darker than the other wings, and is without the usual marginal row of blue spots. I am unfortunately unable to give the date or place of capture of this latter insect.—HENRY A. HILL; 20, Fellows Road, Hampstead, N.W., November 16, 1888.

VANESSA URTICÆ var.—I captured a *Vanessa urticæ* with the left fore wing of a white colour and the rest of the butterfly presenting the usual appearance, in the old chalk-pit known as "Thunor's Leap," on August 1st, 1888. *Vanessa cardui* was a common butterfly at Ramsgate during the past season. In 1887 I did not notice it at all.—A. H. SWINTON; Tudor Villa, Gery Street, Bedford.

DEILEPHILA GALII IN CHESHIRE.—From September 4th last to the 19th, I sent two or three of my family to the sand-hills, Wallasey, to search for larvæ of *Deilephila galii*. They were there on eight occasions, and collected thirty-five larvæ. Between a friend and myself I kept twenty, distributing the remainder amongst my entomological friends. The twenty I kept in a warm kitchen, and on October 29th the first imago emerged, a splendid specimen. Others shortly followed, but early in November three cripples appeared, one after another. This somewhat alarmed me, as I was afraid I was drying them too much. I however sprinkled a very little warm water over them, but only did this once. Since then all have emerged in splendid condition, with the exception of three still in pupa. The last to emerge was on December 9th. The result of the twenty larvæ was fourteen fine specimens, three cripples, and three still in pupa.—SAMUEL JAMES CAPPER; Huyton Park, Liverpool, December 16, 1888.

DEILEPHILA GALII AT ETON.—At dusk on the evening of July 23rd, 1888, a student brought me a fine *D. galii* he had just captured in a corridor on the first floor, into which I presume it had flown through the open window. It appeared to be newly emerged, being quite perfect. Can any reader inform me if it has been taken in this district before?—J. C. O. BLAIR; Mr. Tarver's, Eton College, Windsor. [Among the many places of recorded capture of this insect in 1888, Reading appears to be the nearest locality to Eton.—ED.].

DEILEPHILA GALII IN DERBYSHIRE.—On July 21st, 1888, my son, aged eleven, caught a female *D. galii* hovering over flowers in our garden here. He also took a male specimen, within ten minutes later. I have been collecting for the last twelve years, but never before heard of the species occurring in this county. I have a specimen of *Sphinx convolvuli* measuring five inches, taken near here in 1884, which is the only one I have heard of in this district.—R. C. BINDLEY; Mickleover Vicarage, Derby, November 30, 1888.

LITHOSIA COMPLANA.—With regard to Mr. Jeffery's query (Entom. xxi. 322) as to *Lithosia complana* being captured on the sandhills of the Carmarthenshire coast, and asking whether this was not an uncommon

situation, I should say, as far as my experience goes, that it is nearly its only situation. The whole of my series of some ten specimens are all labelled "Deal coast"; and although I have had a number of specimens sent me from inland localities, I have never had any hesitation in rejecting them as *complana*, and putting them in my series of *lurideola* (*complanula*). I have seen *complana* (female) drying its wings within twenty yards of the sea, and probably one to two miles distant from any trees, and certainly in this case *complana* did not feed on tree lichens, although it may have done so on rock lichens. I feel pretty well satisfied that *pygmaeola* is not a lichen feeder, although I have hitherto failed to breed it. In the 'Entomologist,' x. 46, 47, is an interesting account of the life-history of *L. molybdeola*, and there the Rev. P. H. Jennings gives lichens, chickweed, lettuce, dandelion and sallow as food-plants for this species. I think our *Lithosidæ* are much more general feeders than they are usually considered to be.—J. W. TUTT; Rayleigh Villa, Westcombe Park, Blackheath, S.E.

MELANIC VARIETY OF *AGROTIS CORTICEA*.—In the 'Entomologist' (xxi. p. 285) is a statement that "Mr. Goss exhibited, for Mr. W. J. Cross, an extraordinary melanic variety of *Agrotis segetum*, caught by the latter gentleman near Ely, in July last." Mr. Cross, dissatisfied with the result arrived at in the meeting, sent the specimen on to me. There is not the slightest doubt that the specimen is *Agrotis corticea*, not *A. segetum*, and although the variety is perhaps, in a small degree, "extraordinary," I have repeatedly captured specimens of the same form, with a large number of other varieties of the same species, at Deal, during the month of July in the years 1884–88.—J. W. TUTT.

AGROTIS AGATHINA.—On Sept. 3rd I took a fine specimen of *Agrotis agathina* at sugar. As I have never taken it before, and as several of my correspondents have never known it taken in that way, I should like to know how it is usually taken.—W. E. BUTLER; 91, Chatham Street, Reading. [By searching the flowers of heather-bloom with a light at night. They prefer bloom sheltered by tress.—J. T. C.]

CALOCAMPA SOLIDAGINIS.—We take this species in the same manner as that mentioned by the Rev. C. Thornehill (Entom. xxi. 277), and it also comes freely to sugar. I met with it in the latter way for the first time this season on August 25th. In the locality where *C. solidaginis* is most frequently met with, there are only three birch trees, the moths either resting on bracken branches, heather stems, or on some palings there, which are about a foot from the ground, and rarely on the trunks of the birches.—A. E. HALL; Norbury, Sheffield, November, 1888.

XYLOPHASIA MONOGLYPHA var.—While sugaring here on July 10th I took a fine dark variety of *Xylophasia monoglypha*; as far as I can see, the same as the second figure in Newman's 'Natural History of British Moths.' I have not known this variety to occur in this locality before, though I have collected here for three years or more, and seen many hundreds of the type.—SPOTSWOOD GRAVES; 29, Victoria Street, Tenby, July 25, 1888.

VENILIA MACULARIA var.—During a short visit to Lynmouth, North Devon, in July last, I took a specimen of *Venilia macularia*, of the variety

described by the Rev. J. S. St. John (Entom. xx. 41).—R. H. THOMPSON; 50, Parsonage Road, Withington, near Manchester, December 8, 1888.

CIDARIA RETICULATA.—I come to the conclusion, that the reason *Cidaria reticulata* is so rare an insect is owing to the larvæ feeding so late in the autumn on a food-plant so tender as *Impatiens noli-me-tangere*. I could never get the larvæ to eat any other plant, and would not at all be surprised if this species soon becomes extinct, owing to early frost and snow: with us notably on 1st October, 1888. I have never been able to succeed in rearing the larvæ of *C. reticulata*, although I have tried hard, and have gone almost daily for the food for them. I was successful in breeding it this season, for knowing they made up amongst the loose rubbish about the plants, I determined to try another plan. I went late in the season and collected bags of rubbish from about where I knew the plants had been growing, and was rewarded by rearing a very nice series. I am afraid it will be no use trying the same this winter. I went on the 28th of September to see if there were many plants, and found one corner had a nice bed of them in it. I had a good look for larvæ, and found three, but not nearly half-grown. Being so small, I placed them on a marked plant, and left them. A few days later the frost and snow came, so I went up again at once, knowing the plant was so easily killed, and found every plant cut to the ground. After some looking, I came across two larvæ wandering about. Not knowing what to do with them, I came to the conclusion forthwith to send them to the Rev. B. Smith, of Marlow, who had written to me that he could not help thinking the larvæ might be got to eat something else. I have had a note from Mr. Smith since, to say he had failed with those I sent. I can see one chance for *C. reticulata*, which is that some may stay more than one year in the pupa state; otherwise there is but little chance for it.—H. MURRAY; Lowbank Villas, Carnforth, December 5, 1888.

PENTHINA POSTREMANA.—I was fortunate enough to breed a very nice series of *P. postremana* from *Impatiens noli-me-tangere*. last season.—H. MURRAY; Lowbank Villas, Carnforth, December 12, 1888.

THE GENUS *SCOPARIA*.—Two more seasons have passed since my last note on this subject (Entom. xxi. 17), and little or nothing has been done towards further elucidating this genus, except that Mr. P. B. Mason and Mr. G. C. Barrett have at length given in their adhesion to the opinion I expressed (Entom. xviii. 130) that *S. gracilis* should be merged in *S. alpina*. Will none of my brother entomologists in Scotland assist me in working out the question of the specific identity of *S. ambigua* and *S. atomalis*? Convinced as I am of their identity, I cannot satisfactorily prove it from lack of material. We know that *S. ambigua* is abundant throughout England and Scotland, up to the Highlands, where, as in the Hebrides, the Orkneys, and the Shetlands it disappears, and its place is taken by *S. atomalis*, which has never occurred in the south, with the exception of a single specimen recorded from Wales by Mr. Gregson ('Intelligencer,' i. p. 31); and this we are particularly told was much lighter in colour than the Scotch specimens. On the west coast of Argyleshire and the small islands in the Sound of Jura, Mr. Howard Vaughan and I have taken, nearly on the sea-level, specimens of an intermediate character; and if entomologists working in Scotland, especially near the junction of the Highlands and Lowlands, would but collect these species for comparison,

the matter would speedily be settled. I have worried all my friends and correspondents, and also advertised, but all to no purpose. As regards the rest of the genus, nothing has been done to show whether *S. cratagella* is, or not, anything more than a local chalk form of *S. mercurella*; while the links that appear to bind *S. basistrigalis* to *S. ambigualis* seem to strengthen every day. With a little united effort these questions might easily be settled next year, and the genus put in a thoroughly satisfactory condition.—C. A. BRIGGS; 55, Lincoln's Inn Fields, December 10, 1888.

SIREX JUVENCUS IN LONDON.—Might not the insect (Entom. xxi. 282), have come out of a telegraph pole, or some other imported pine timber? I found a very fine specimen in a plantation of mine here in 1881.—EDWARD R. DALE; Glanville's Wootton, Dorset, November 3, 1888.

LEPIDOPTERA IN SUSSEX.—I did but little during last season, on account of the very damp summer, which made collecting most unfavourable. With the first bright days of April examples of hibernated *Gonopteryx rhamni* and *Vanessidæ* were observed in plenty. The sallows were well out by the middle of the month, but the only moths I took at them were the commoner Tæniocampidæ. *Euchloë cardamines* was unusually abundant towards the end of May, and about the same time I took *Anarta myrtilli* on Ashdown Forest, and *Argynnis euphrosyne* was just beginning to emerge in large numbers. On June 7th I captured a magnificent *Vanessa cardui*, the first specimen I had seen at Groombridge since 1885; during the next few weeks I saw several others. Larvæ of *Bombyx neustria* were to be found in great numbers this month, as well as those of *Diloba cæruleocephala*, the latter generally occurring on laurel in the garden. Larvæ of *Dicranura vinula* in various stages of growth were plentiful on willow bushes. Towards the end of June I met with numerous specimens of *Arctia villica*, and *Zygæna filipendulæ* was to be seen flying in the sunshine in most places where the long grass was growing. *Tanagra atrata* (*charophyllata*) also appeared in two localities. At the commencement of July, a long row of pinks in the garden proved very attractive; five *Sphinx ligustri*, one *Charocampa elpenor*, and several smaller moths being taken in a very short time. About this time *Smerinthus ocellatus*, *S. populi*, *Bombyx rubi*, *Plusia chrysitis*, and *Angerona prunaria* occurred. On the 9th *Macroglossa fuciformis* was taken flying over hedge wound-wort (*Stachys sylvatica*), and *Acronycta megacephala*, also *Aplecta nebulosa* were found at rest. The larvæ of *Cucullia verbasci* were common on water-betony and mullein. *Nemeophila russula* occurred on Broadwater Common. On the evening of the 23rd I tried sugaring in a small wood, and as regards numbers had the most successful evening that I ever remember. It was very sultry, pitch-dark, and a few drops of rain were falling. Moths were in countless numbers on the trees, and I took *Leucania conigera*, *L. comma*, *L. pallens*, *Xylophasia lithoxylea*, *X. monoglypha*, *Dipterygia scabriuscula* (*pinastri*), *Miana bicoloria* (*furuncula*), *Apamea gemina*, *A. didyma*, *Agrotis exclamationis*, *A. nigricans*, *Noctua triangulum*, *N. festiva*, and *Mania typica*. *Argynnis selene* was out in immense numbers on Broadwater Common about the middle of the month, as was *Bupalus piniaria*, among the pine trees. On August 3rd I noticed *Thecla quercus* in the village flying under an oak tree, and found a larva of *Saturnia pavonia* feeding on elderberry. *Charæas graminis* occurred at light at the

end of August. I was surprised to find large numbers of the larvæ of *V. urticae* about the second week in September, in all stages of growth, on nettles. Most of these turned to pupa about October 2nd, and emerged about the 15th of the same month. During this latter month, specimens of *D. cæruleocephala* were frequently taken at light.—W. H. BLABER; Sunnyside, Groombridge, Sussex, November 9, 1888.

NOTES FROM WIMBORNE.—Last season I collected above fifty larvæ of *Euchloë cardamines*, also several of *Pieris napi* and *P. rapæ*, all feeding upon common watercress in a damp ditch; nearly all have emerged, females of the first-named being far more numerous than males. I have bred a fine series of *Gonepteryx rhamni* from ova and larvæ; one specimen is curious, in colour it is intermediate between the sexes. The larvæ of *Macroglossa fuciformis* have been plentiful this year during July and August. I took above forty, in all stages. They were very easy to detect upon honeysuckle leaves; when young they perforate two or three holes near the midrib, and rest underneath. About thirty have changed. I find all are alive and free from parasites. On June 6th I caught a female *Colias edusa*; it is in excellent condition and does not look as if it had hibernated; the fringes are good. The following is a partial list of my captures here:—On a patch of heath about two acres in extent, *Hesperia malvæ*, *Nisoniades tages*, *Pamphila sylvanus* and *P. thaumas*, dark forms. *Cænonympha pamphilus*, very fine, a female with two perfect ocelli on the upper surface of both hind wings. *Polyommatus phlæas*, some with scarcely any spots at all. *Lycæna ægon* very plentiful, from deep purple to light blue; one male with dark iridescent blotches upon the centre of the upper anterior wings. *L. icarus*, an isolated colony, about a dozen of which I netted, all the females, five in number, are more or less confluent, two especially so, whilst the males are of the ordinary type. *Thecla rubi*, *Saturnia carpini*, *Euthemonia russula*, several and two females, *Anarta myrtila*, *Fidonia pinaria* in swarms, the first being alive with them; I find the pupæ mostly in rotten wood under the trees. *Lithosia mesomella*, *Agrotis porphyrea* and others; although I found *Thecla rubi* and *Hesperia malvæ* common in the spring, I failed to find any in the autumn; the same with other double-brooded species. *Satyrus semele* common on fir-tree trunks, a position this insect usually rests upon, where bare rock or ground is absent. By beating, searching trees, &c., I collected the following:—*Eurymene dolabraria*, *Ourapteryx sambucata*, *Geometra papilionaria*, *Orgyia pudibunda*, *Chelonia villica*, *Arctia fuliginosa*, *Ellopiæ prosapiaria*, *Platypteryx hamula*, *P. falcataria*, *Macaria alternata*, *Pseudoterpna pruinata*, *Calligenia miniata*, *Acidalia emarginata*, &c. At sugar *Demas coryli*, *Thyatira derasa*, *T. batis*, *Acronycta psi*, *Xanthia fulvago*, *X. flavago*, and a fine series of *Acronycta ligustri*, from pale grey to almost black, one suffused with green. One *A. leporina*, dark grey, from a larva found upon willow. On September 27th I found a brood of *Vanessa urticae*, the last of which emerged to the imago on October 30th; although well fed they are small and dark, some red between the black spots instead of the usual yellow; one has only one spot and a faint dot in the middle of the forewings. *Psyche villosella* very plentiful upon heath; I took numbers of the larvæ in their cases during the spring, but quite six females emerged to one male. I put about a dozen cases (which I had cut open) containing female pupæ in a separate box, and upon opening it some time afterwards, there were hundreds of minute larvæ, some

with cases made of paper, &c. Knowing the eggs were unfertilised I destroyed the lot, supposing they would produce females only. I visited Brockenhurst occasionally during the last fortnight in July, and found eleven pupæ of *Vanessa polychloros*, nine from a shed under some elms, close by the station, and two in the station whilst waiting for the train, and a gentleman gave me six from a batch he discovered feeding upon swallow; eleven have emerged, but the elm-fed specimens are larger than the others. In the forest I netted one confluent male, an *Argynnis paphia*, four *valezina*, several *A. adippe*, and *Thecla quercus*, the latter resting upon ferns under young oak trees. In one of the ridings I saw a large dragon-fly dart at a male *paphia*; both fell to the ground, the latter was soon disabled. I have seen them attack flies, but never such big game before. — J. H. FOWLER; Leith Cottage, Grove Road, Wimborne, Dorset, November 8, 1888.

EARLY SEASON IN NEW ZEALAND. — After a cold and tempestuous summer, we have here experienced a remarkably fine winter and early spring. On Sept. 16th I was much surprised to come across several larvæ of *V. gonerilla*, who had passed their second moult and were feeding vigorously. From this it would seem probable that the "new" specimens are likely to appear as early as November 1st, which will be, according to my experience, at least two months before the usual time. I have not observed quite such a marked advancement in other insects, although the season seems to be a very early one. — G. V. HUDSON; Wellington, New Zealand, October 17, 1888.

ROCHEFORT IN AUGUST. — Rochefort is a small town in the Belgian highlands, built in a picturesque valley at the level of 400 meters above the sea. It is surrounded by woods of varied growth and affords every accommodation to tourists. There are two good hotels in the town, of which the "Hotel Biron" is the largest, and at which attention is paid to the wants of the entomologist. The geological formation of the neighbourhood is schist, overlaying a hard limestone with some marble. The limestone rocks often penetrate the schist, and form hills of a dark blue-black colour. Taking the Hotel Biron as a central point, excursions may be made in various directions. To the south stretches the Han road, which winds round the side of a hill and leads to the famous grottoes of that name. The road is overhung on one side by woods, which afford excellent hunting-ground. The woods belong to the commune and are free to anyone. To the west is the road to Dinan, which is very beautiful, and leads through the forest of Rochefort, as does also the Cigny road, which branches off from the Dinan road just beyond the town. This forest is also communal and therefore free. The trees composing the forest are very various in size and character, but most are small; the underwood is composed of nut-bushes and wild plum, with some broom. To the northward is the Jemelle road, from which a path branches off, leading down a deep gully between limestone hills. This gully teems with insects. Many Lepidoptera are common in all these localities; of these I give a list, so as not to refer to them again: — *Argynnis paphia*, *Vanessa io*, *V. atalanta*, *V. cardui*, *Erebia medea*, *Pararge egeria*, *P. megæra*, *Satyrus semele*, *Thecla betula*, *Lycæna corydon*, *Colias hyale*. *Plusia gamma* was so abundant as to become a nuisance on the Han road. On a bright sunny afternoon, this is a good locality, espe-

cially where tufts of *Valeriana officinalis* grow. An occasional *Vanessa antiopa* may be seen, majestically sailing down from the overhanging trees, or springing up in front of the too ardent naturalist, just far enough away for him to be unable to reach it. This species is said to be very common in the neighbourhood, but owing to the bad season they have been very scarce this year. Now and then a *Callimorpha hera* will fly across the road, the bright red of its wings making it a conspicuous object, or it may be taken on the valerian-heads in company with numberless Vanessidæ and Theclæ. A few *V. urtica* may also be seen with *Erebia æthiops*. In the more open spots *Gonepteryx rhamni* is common. The trees which border the road yield *Catocala nupta*, *Liparis dispar*, *L. monacha*, &c. In the woods above the Han road, which require to be worked in the afternoon, as no sun reaches them in the morning, yield *Vanessa c-album* and *E. æthiops*. In the evening many Geometræ may be found. On the summit of the hill above the wood there is an open patch of grassy ground where *Argynnis aglaia* may be caught, with *A. dia*, *E. hyperanthes*, *Cænonympha pamphilus*, *C. arcania*, *L. icarus*, *L. minima*, *P. thaumas*, and *P. comma*. On the right side of the Dinan road, just beyond the town, there is a range of bare hills leading to the convent of St. Remy and the famous marble quarries. Insects are scarce here, but the large *H. circe* may be caught in fair numbers, with an occasional *Papilio machaon*. In the forest of Rochefort there are few roads which make it difficult to work, but it abounds in flowers and insects. The Lepidoptera worthy of note are *V. antiopa*, *A. adippe*, with var., *chlorodippe*, *A. dia*, *E. æthiops*, *E. ianira*, *C. pamphilus*, *C. arcania*, *P. phlæas*, *L. medon*, *L. argiolus*, *L. dorylis*, *L. astrarche*, *Pieris napi*, *L. sinapis*, *G. rhamni*, *C. edusa*, *P. thaumas* and *P. comma*. Among the moths, *Macroglossa stellatarum* and *O. antiqua*. In a gully on the Jemelle road I caught *H. circe*, *V. polychloros*, *L. icarus* and var. *icarinus*, *L. bellargus*, *L. astrarche*, *L. dorylas*, *L. medea*, *C. edusa*, *G. rhamni*, *P. napi*, *P. brassica*, *P. rapæ*, *S. alcea*, *S. alveus*, *N. tages*, *E. tithonus* and *H. comma*. A few *Acidalia ornata* were also caught, with larvæ of *Smerinthus ocellatus*, *Cossus ligniperda* and *D. vinula*. One night only I went out with a lantern to this gully, and obtained numerous *Pyrales* and other interesting moths, especially Tortrices and Tinæ, which were very common. Before closing, I must allude to the beautiful schist-coloured grasshopper, with pale blue under wings, which form so conspicuous a feature among the insects. Looking at the collection, one is struck with the very dark appearance of the insects generally, and especially with the deep colours of the *P. megæra* and *P. egeria*, which are very much darker and smaller than those which I captured a few years ago in the plains of Northern France, though the French specimens are not faded. This dark coloration is no doubt due to the altitude of the locality, and also perhaps somewhat to the dark colour of the rocks. The specimens of *E. medea* are less hairy-looking and brighter in colour than those which I obtained in Oban (Scotland). I feel sure that a visit to this locality would amply repay anyone who could spend a holiday there. August is a little too late, as many of my specimens are the worse for wear. Orthopterists and coleopterists especially will find Rochefort a rich collecting-ground.—E. W. CARLIER; Physiological Laboratory, Edinburgh University.

THE WET SEASON AND OCELLI. — According to Mr. de Nicéville (Entomol. Soc., Feb. 8th, 1885), the ocellated spots on the under sides of

certain Indian *Satyridæ* differ very markedly in the wet and dry seasons' broods, and are fully developed in such cases in the dry season only. It therefore becomes of especial interest to learn (Entom. 273) that Mr. J. E. Winkworth has taken during the past wet season in England, five examples of *Epinephela hyperanthes* in which the ocelli are almost suppressed, all of them in the same county—Berkshire. *E. hyperanthes* var. *arete*, and forms approaching thereto, are not of exceeding rarity in most years, but it will be of very great interest if we find, as Mr. Winkworth's note seems to indicate, that they have been especially abundant during the past season. It is therefore to be hoped that those who have knowledge of this matter will publish the same.—T. D. A. COCKERELL; West Cliff, Colorado, November 27, 1888.

ABNORMAL DEVELOPMENT.—One of the most remarkable cases of abnormal development I have ever met with, recently came under my notice. On November 16th I met with a larva of *Pieris rapæ* which had spun up previous to pupating. Wishing to renew my specimen of this species, I took it with the intention of preserving it, and placed it in a small tin box, which I always carry in my vest pocket. A few hours later I noticed it had pupated; replacing it in my pocket, I forgot it until Nov. 28th, then, upon opening the box and noticing that the pupa appeared to be dried up, I broke it in halves, and to my surprise found the perfectly developed imago inside. That this species should be developed in twelve days is not, I think, a very exceptional occurrence, but in this case the pupa was loose in a box in a pocket, carried not less than eight miles each day, and subjected to every motion of the body. It shows, I think, that a very slight elevation or depression of the temperature serves to advance or retard the development of insects.—W. T. PEARCE; 111, High Street, Gosport, December 11, 1888.

HYBERNATING LARVÆ.—Can any one tell me the best way of rearing hybernating larvæ? I have *Uropteryx sambucaria* feeding on ivy, which I am anxious to successfully rear.—HENRY A. HILL; 20, Fellows Road, Hampstead, N.W., November 7, 1888.

RETARDED EMERGENCE.—I had a curious instance of this the other day. A solitary pupa of *Dicranura vinula*, which remained over from larvæ taken in 1887, suddenly emerged on the 10th of November, and developed itself to its own satisfaction and my considerable surprise.—G. M. A. HEWETT; The College, Winchester.

CELERY-FLY.—My plants of celery have often been much injured by the larva of some insect burrowing in and destroying the leaves, in which it makes patches or blotches rather than galleries. The pest has been unusually abundant this year in my own and neighbouring gardens, the worst of its ravages being committed in September and October; so that in the latter month many rows of celery about here presented a withered and sickly appearance, with hardly a green leaf to be seen, the growth of the plant being altogether checked. I should be glad to know the order and name of the insect, and also whether any plan can be recommended for getting rid of it. I have picked up a number of the pupæ, specimens of which I should be happy to forward to anyone who is interested in its natural history.—(Rev.) G. A. SMALLWOOD; Willington, Burton-on-Trent, November 10, 1888. [The history and a figure of the Celery-fly (*Tephritis*

onopordinis), with notes on prevention and remedy, is given in Miss E. A. Ormerod's 'Manual of Injurious Insects,' pp. 58-61.—E. A. F.]

PHYTOMYZA CHÆROPHYLLI.—The autumn generation of this mining dipteran has occurred with us abundantly in the leaves of *Chærophyllum temulum* and *C. sylvestre* during September and October. The mine is most abundant in *C. temulum*, though it occurs, but far more sparingly, in *C. anthriscus* and *C. sylvestre*, as noticed first by Kaltenbach in 1872. The larva first makes a somewhat serpentine tunnel in an upper segment of the leaf-divisions, which it afterwards enlarges till the pulp is nearly all consumed, and a conspicuously white patch is all that is left to tell of its earlier life. The larva mostly pupates in the soil below, occasionally even in the mine itself. The tiny pupa is black and glossy, and the fly will doubtless put on wings in the spring of next year.—PETER INCHBALD; Hornsea, Holderness, December 19, 1888.

MOULD.—Can any reader of the 'Entomologist' suggest a remedy for the prevention of mould? Several specimens in my drawers are slightly affected. One time my cabinet did not occupy one of the driest situations. I have cleaned the few specimens that were affected by means of a camel-hair brush. Is mould contagious, and are the same specimens likely to be subjected to it again? A prevention was given some years ago by the Rev. J. Tasker (Entom. xv. 233), but from the experience of Mr. H. Dobson, jun. (Entom. xv. 234), it was injurious to the white insects, turning them a dirty cream colour; by so doing the remedy becomes equal to the disease.—THOMAS WALPOLE; 9, Dudley Terrace, New Somerby, Grantham. [Calvert's glacial carbolic acid should be placed on a small piece of cotton-wool on the head of a pin, about the centre of the affected drawer. This will destroy all life, either vegetable or animal, in the drawer, which should be kept tightly closed for a few days. Mould is a fungoid growth which spreads or returns wherever the spores find a suitable nidus to commence a further colony.—J. T. C.]

ERRATUM.—Entom. xxi. p. 316, line 7, for *Syrichthus malvæ (alveolus)* read *Hesperia sylvanus*.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—December 5th, 1888.—Dr. D. Sharp, F.L.S., President, in the chair. Mr. B. A. Bower, of Eltham, Kent, was elected a Fellow of the Society. Mr. W. F. Kirby exhibited, for the Rev. Dr. Walker, a variety of the female of *Ornithoptera brookiana*; he also exhibited, for Major Partridge, an undetermined species of the genus *Hadena*, captured last summer in the Isle of Portland. Mr. R. South exhibited a series of specimens of *Tortrix piceana*, L., from a pine wood in Surrey; also melanic forms of *Tortrix podana*, S., from St. John's Wood. Prof. Meldola exhibited, for Dr. Laver, a melanic specimen of *Catocala nupta*, taken last September at Colchester. Mr. E. B. Poulton exhibited preserved larvæ of *Sphinx convolvuli*, showing the extreme dark and light forms of the species. Mr. M'Lachlan called attention to a plate, representing species of the genus *Agrotis*, executed by photography, illustrating a memoir by Dr. Max Standfuss, in the Correspondenz-Blatt, Verein 'Iris,' in Dresden, 1888. He considered it was the best example of photography as adapted for entomological purposes he had ever seen,

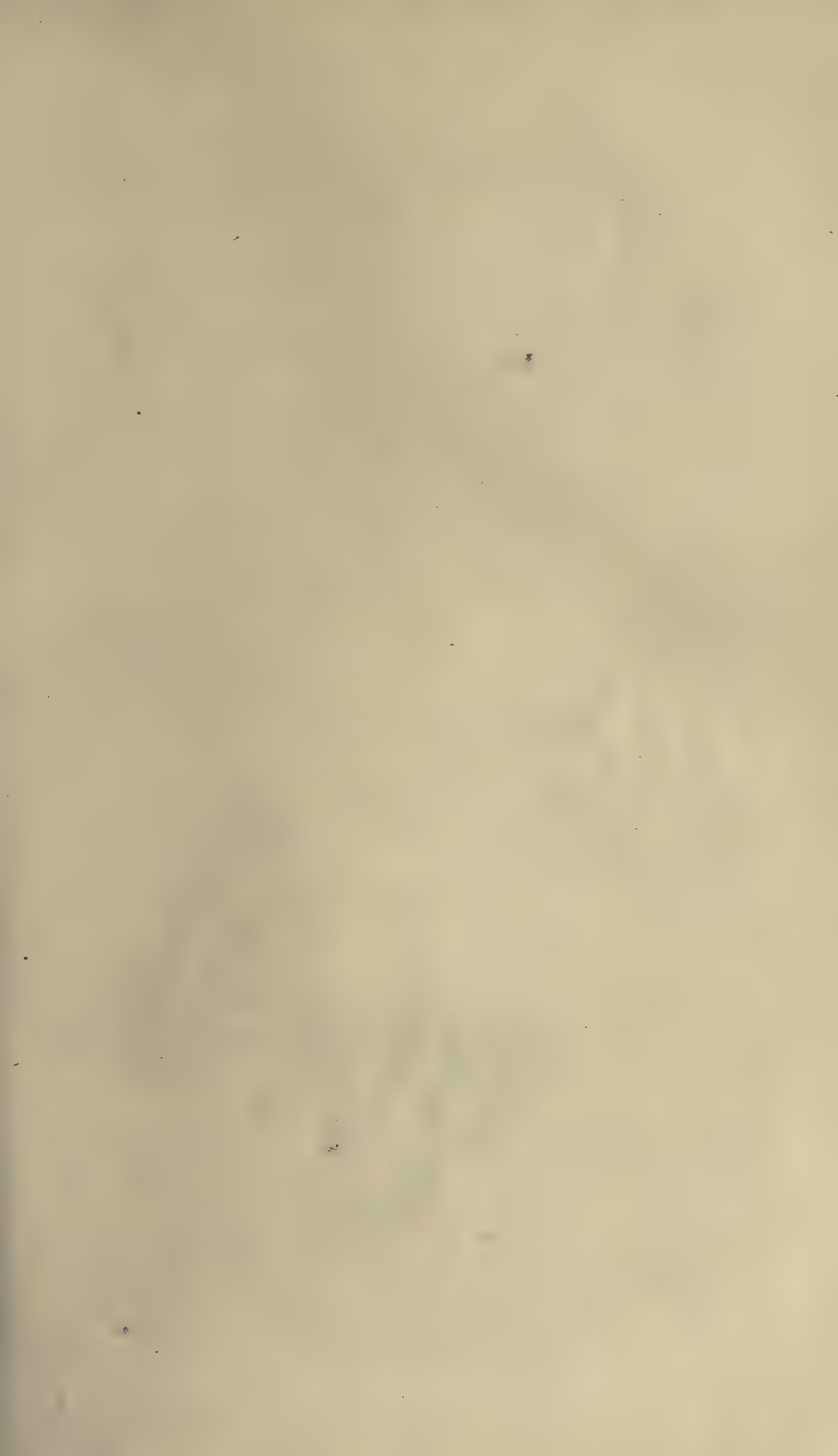
especially as regarded its stereoscopic effect. The Rev. Canon Fowler exhibited a specimen of *Mycterus curculionoides*, sent to him by Mr. Olliff, and taken by Mr. Gunning near Oxford about 1882. Mr. W. Nicholson exhibited several melanic varieties of *Argynnis niobe* and *A. pales*, collected by himself last summer in the Engadine. Mr. J. H. Leech exhibited a small collection of Lepidoptera formed last year by Mr. Pratt at Kiukiang, Central China. It included several new species, also specimens of a variety of *Papilio sarpedon* and other interesting forms. Mons. A. Wailly exhibited a collection of Lepidoptera lately received from Assam, containing upwards of thirty-five species of *Papilio*, *Ornithoptera*, *Charaxes*, *Diadema*, *Cyrestis*, and other genera. Mr. Meyer-Darcis exhibited specimens of *Sternocera tricolor*, Kerr, and *S. variabilis*, Kerr, from Lake Tanganyika; also two new species of *Julodis* from Syria. Mr. F. Merrifield exhibited, and made remarks on, a long series of *Selenia illustraria*, *S. illunaria*, and *E. alniaria*, in illustration of his paper on "Pedigree Moth-breeding." Lord Walsingham exhibited and made remarks on, a series of species representing the genera *Snellenia*, Wlsm., *Ædematopoda*, Z., and *Eretmocera*, Z. The Rev. T. A. Marshall communicated a paper entitled "A Monograph of British *Braconidæ*. Part III." The Rev. Dr. Walker communicated a paper entitled "Description of a variety of the female of *Ornithoptera Brookiana*." Lord Walsingham read a paper entitled "A Monograph of the genera connecting *Tinægeria*, Wlk., with *Eretmocera*, Z." A discussion ensued, in which Mr. Stainton, Dr. Sharp, and others took part. Mr. Merrifield read a paper entitled "Incidental Observations in Pedigree Moth-breeding." This paper contained a detailed account of experiments with *Selenia illustraria*, *S. illunaria*, and *E. alniaria*, which, so far as they had yet proceeded, indicated that retardation of development in the growing stages of the larvæ, as well as in the pupal stage, was the cause of the darkening of colour in the perfect insects; that a low temperature had the effect of causing such retardation; and that growing the larvæ at a forcing temperature tended to produce a warmer and yellower tint in the colouring of the moths. Lord Walsingham, Mr. Poulton, Prof. Meldola, Mr. White, and Mr. Merrifield took part in the discussion which ensued. Mr. J. H. Leech read a paper "On a small collection of Lepidoptera from Kiukiang." Captain Elwes said he had examined this collection with very great interest, and was struck with the similarity of many of the species to those from Sikkim.—H. Goss and W. W. FOWLER, *Hon. Secretaries*.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.
—November 22nd, 1888. John T. Carrington, Vice-President, in the chair. Messrs. W. G. Dawson, F. E. Brown, A. Marshall, and J. Katy were elected members. Mr. J. Jäger exhibited *Agrotis præcox* from Glamorgan-shire, obtained by shaking the sand-crests; dark forms of *Acidalia marginepunctatata* from S. Wales, *Cidaria reticulata* from the Lake District, and *Lobophora viretata* from Staffordshire. Mr. E. B. Nevins, *Leucania putrescens*, S. Wales; *Acontia luctuosa*, Surrey; two dark forms of *Heliothis peltigera*, one taken on the 15th, and the larva of the other on the 18th, August, which produced an imago on the 17th September. Mr. R. Adkin, *Pieris napi* from West Ireland, approaching var. *bryoniæ*, Hb.; *Ellopiæ prosapiaria* from English and Irish localities; *Ematurga atomaria*, *Larentia didymata*, *Eupithecia nanata*, and *Hypsipetes sordidata* from English, Irish,

and Scotch localities. Mr. Tugwell, two specimens of *Margarodes unionalis*, taken, 1877, at Kingsdown, Kent, off flowers of *Eupatorium cannabinum*; two examples of *Mecyna polygonalis*, both taken in 1877,—one at Deal and the other at Kingsdown; a series of *Eupithecia extensaria* from King's Lynn; and *Acidalia immorata* from Lewes, and made some observations upon his exhibit. Mr. Henderson, examples of the second brood of *Tephrosia crepuscularia* from Oxfordshire. Mr. Hawes, ova of *Bombyx neustria*, clustered round the stalk of a plum. Mr. West (Streatham), *Polia chi* from N. Wales.

December 13th, 1888. T. R. Billups, President, in the chair. Messrs. G. Tindall and M. Winkley were elected members. Mr. Frohawk exhibited the specimen of *Vanessa antiopa*, taken by him at Chatham, together with German and American examples of the species. Mr. R. Adkin, on behalf of Mr. Austin, a pale fawn-coloured var. of *Epinephele ianira*, a strongly-marked example of *Cænonympha pamphilus*, blue forms of the male and female of *Lycæna bellargus*, and the under side of the male with dark grey ground colour and the usual spots absent; also pale, xanthic, and grey forms of *Bryophila perla*, all taken at Folkestone. Mr. Carrington, a strongly-marked var. of *Vanessa c-album*, taken near Droitwich. Mr. Adye, unusually large and small forms of *Selenia tetralunaria* and *Metrocampa margaritaria*. Mr. J. T. Williams, *Acidalia immorata*, Lewes; *Deiopeia pulchella* from Southbourne, 1876; and *Cymatophora* or from the Hebrides. Mr. Helps, *Ptilophora plumigera*, bred. Mr. R. South, British and foreign examples of *Dianthæcia* allied to *D. nana*, and contributed notes thereon; a discussion ensued, Messrs. South, Carrington, Gregson, Tugwell, and others taking part. Mr. R. Adkin exhibited series of *D. nana* from Kent, Surrey, Shetland, and the Hebrides; and Mr. Hall, series of many species of *Dianthæcia*. Mr. South also exhibited a form of *Gortyna ochracea* from Perthshire, and made some observations thereon. Mr. W. H. Tugwell, forms of *Hypsipetes sordidata*, bred from larvæ obtained from Huddersfield; *Agrotis simulans*, Aberdeenshire; and *Nemeophila plantaginis*, var. *hospita*, from Forfarshire. Mr. Manger, *Dynastes hercules*, Fab., from Montserrat, *Chalcosoma atlas*, Fab., *Megalosoma thesus*, Fab., and a species of *golofa*, which was not identified,—all from Brazil. Mr. Billups, fifty species of *Chrysomelidæ*, from various parts of the world; also some specimens of *Miaris micros*, taken by Mr. West in Headley Lane, by sweeping, in the year 1884. Mr. West said that when he took this species it was extremely abundant, but he had not been able to find it since. Mr. Billups also exhibited *Hotinus clavatus*, Westw., taken by Mr. Elwes at Darjeeling, 1886.—H. W. BARKER, Hon. Sec.

AN ENTOMOLOGICAL SOCIETY FOR BIRMINGHAM.—A preliminary meeting of some of the Birmingham entomologists was held, on December 13th, to discuss the formation of a local Entomological Society. The chairman, Mr. W. G. Blatch, made some remarks indicating the lines upon which he considered such a Society should work; and, after considerable discussion, it was unanimously agreed that such a Society should be started, to be called the Birmingham Entomological Society. Mr. W. G. Blatch was elected President; and Mr. Colbran J. Wainwright, of Hall Road, Handsworth, Birmingham, Hon. Secretary, from whom particulars may be obtained. A second meeting will shortly be held to draft a constitution and rules, and settle all necessary preliminaries.





H Knight ad nat.

West, Newman & Co chromo.

The Genus Luehdorfia.

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[No. 309.]

DESCRIPTION OF A NEW *LUEHDORFIA* FROM JAPAN.

By J. H. LEECH, B.A., F.L.S., &c.

(PLATE I., FIG. 1.)

LUEHDORFIA JAPONICA, nov. sp.

Expanse, 70 mm. Primaries pale yellow, black at base and external margin, with three transverse oblique black bands on the disc, and one parallel with outer margin, with which the third oblique band is united below the middle; a black dash from the costa between first and second and second and third oblique bands. Secondaries pale yellow, with a broad black band along the inner margin, and another, oblique and interrupted, on the disc beyond which is a black costal dash: the outer third black, enclosing five blue spots, and edged externally with some orange patches; a conspicuous crimson blotch above anal angle. Fringes chequered black and white. Under surface as above, but the crimson colour assumes a band-like form, traversing the wing parallel with outer margin from anal angle to second subcostal nervule; the orange on outer margin also forms a complete band.

This species was erroneously referred to as *L. puziloi* by Mr. Pryer in his catalogue of 'Lepidoptera of Japan,' and subsequently by myself in my paper on the "Lepidoptera of Japan and Corea," P. Z. S., 1887, when I did not possess specimens of the species. I at first considered it to be merely a local form of *L. puziloi*, but the following characters are amply sufficient to separate it from that species. In the first place the "pouch" of female of *L. japonica* is without a keel, and is black instead of light chestnut; this, without reference to other points of difference, at once distinguishes it; but it is further much larger in size, the ground colour is darker, and the anal blotch is broader and of a bright crimson.

With regard to the pouch of *L. puziloi*, M. Oberthür is of opinion that this is probably not developed until pairing has

taken place. If this is so, it may account for some of the females, both of *puziloi* and *japonica*, being without this appendage.

Recorded from Yesso and the Kurile Islands. There were several specimens in Pryer's collection, which has lately come into my possession. These were taken at Gifu in April, and are probably the examples referred to (E. M. M. xxiv. 66). I also have one example which was taken by my native collector at Bungo, Isle of Kiushiu.

Luehdorfia puziloi has been recorded from Eastern Siberia, Vladivostok, and Isle of Askold.

EXPLANATION OF PLATE I.

Luehdorfia japonica, Leech.—Fig. 1, ♀. Fig. 1a, ♀, under surface; fig. 1b, ♀, pouch, full view; fig. 1c, ♀, pouch, side view.

Luehdorfia puziloi, Erschoff.—Fig. 2, ♀. Fig. 2a, ♀, under surface; fig. 2b, ♀, pouch, full view; fig. 2c, ♀, pouch, side view.

ON THE VARIATION OF INSECTS.

By T. D. A. COCKERELL.

(Continued from p. 6.)

h. The so-called hermaphrodites.

Colias edusa, Entom. xi. 101. *Lycæna icarus*, Entom. xi. 101, 209; xx. 302. *L. ægon*, Entom. xi. 101. *Clostera curtula*, Entom. xi. 103. *Epione vespertaria*, Entom. xi. 104. *Satyrus semele*, Newman, Brit. Butt. 89. *Odonestis potatoria*, Entom. xvi. 188. *Lasiocampa trifolii*, Ent. Mo. Mag. 1882, iii. *Anthocharis cardamines*, Entom. xii. 181 (♂).—In these examples part of the insect has the superficial characters of the male, and part of the female, in a similar manner to the forms quoted under "g." That they are not true hermaphrodites is clear enough, and it is highly probable from analogy that the primary sexual organs are aborted, though I am not at present aware of any positive evidence that this is the case. Having in view the fact that in cases of female dimorphism specimens combining the two forms may occur, and further, that the secondary sexual characters of female Lepidoptera have probably arisen in dimorphisms (see under "f"), it seems possible that these examples are cases of partial reversion, tokens that the female was once dimorphic.

i. One sex assuming the superficial characters of the other.

Biston hirtaria, ♂, with ♀ colouring, Entom. xi. 102. *Epione vespertaria*, ♂, with ♀ colouring, Entom. xi. 170, and coloured fig. *Colias edusa pseudomas*, ♀ without yellow spots on black marginal bands, Entom. xi. *Epinephle ianira pseudomas*, Newman, Brit. Butt. 92. *Aphycus ceroplastis pseudomas*,

Howard, in describing this Chalcid from New Mexico, mentions that four females had a black shade in the middle of the mesocutum, and black instead of yellow axillæ, thus resembling the normal ♂ of the species.—Following the line of argument under “h,” these will appear as examples of reversion to the primitive type, which has been maintained typically in one sex, but lost in the other. From the facts recorded by Mr. J. Bland Sutton, concerning a female golden-pheasant which took the plumage of the male, and his comments thereon, it would appear probable that the immediate cause of this reversion to the supposed primitive type is the abortion of the organs of generation. In many species of vertebrata the young of one sex resemble closely the adult of the other in superficial characters; it may be that some Lepidoptera pass through a primitive stage, which characterises the adult of the opposite sex, in the pupa, and the sexual organs being occasionally aborted at this critical moment, the secondary sexual characters do not further develop, resulting in a specimen such as those referred to above. It would, therefore, be of the highest interest if any future captor of such a specimen would dissect it while fresh, and examine the condition of the reproductive organs.

k. Seasonal forms.

Papilio ajax, spring form *telamonides*, Feld., and summer form *marcellus*, Bd. *Pieris protodice*, spring form *vernalis*, Edw., is smaller and darker than the summer form. *P. oleracea*, summer form often larger, and wings thinner and purer white than spring form. *P. rapæ*, “Farther south (in the United States) the winter (spring) form tends to pure white on the upper surface” (G. H. French). *Colibris eurytheme*, spring form *keewaydin*, Edw., smaller than summer form, duller yellow and with less roseate reflection, both sides more sprinkled with black scales, the orange patch on the fore wings not so marked, sometimes almost absent. *Phyciodes tharos*, seasonal forms *marcia*, Edw., and *morpheus*, Fb.; *P. phaon* also has seasonal forms. *Grapta interrogationis*, hibernating form *fabricii*, Edw., summer form *umbrosa*, Lintn.; “There are about four broods in a season, and while those of the last or hibernating brood are the pale forms, the others are more or less mixed, as Mr. Edwards has shown” (G. H. French). *G. comma*, hibernating form *harrisii*, Edw., summer form *dryas*, Edw. *Lycena pseudargiolus* vars. *lucia*, Kirby, and *marginata*, Edw., coming from pupæ which have hibernated, show coalescence of markings on the under side of the hind wings. *Selenia bilunaria julia*, Haw., and *S. lunaria delunaria*, Hb.—In North America, owing to the great difference between the summer and winter climates, seasonal forms are often very marked. As a rule, the spring form, emerging from pupæ which have hibernated, is smaller

and darker than the summer brood, a condition which has been attributed to the effects of cold while in the pupa stage. But, strangely enough, a moderate amount of cold appears to have an opposite effect, for in our climate the spring *Pieridæ*, which are dark in America, are distinctly lighter than the summer forms, and the imported *P. rapæ* would seem to have retained that character somewhat in America. Also, as regards size, I believe that it is found that the races of large silk-moths, which are bred on the cooler slopes of the Himalayas, are invariably larger and finer than those of the same species from the heated plains of India; and this has been attributed to their longer sojourn in the pupal state, whereby they have more time for development. The only theory I can advance to harmonise these various facts may seem to many a somewhat unwarranted one, and I shall look with interest for any comments on it. The darker and smaller forms may be supposed always to be those whose development has been quick, the metabolism great in proportion to the growth, while the larger and lighter forms have developed more slowly, with a longer period of growth, and less intense metabolism; in short, as Mr. P. Geddes would say, the first have developed katabolically, the last anabolically. When eggs or seeds are subjected to a low temperature, although life is not necessarily extinguished, growth and metabolism cease. The winter in North America is sufficiently cold to have a like effect upon hibernating pupæ,—they live, but do not grow. The summer comes on with comparative suddenness, and the hot rays of the sun throw them into the most intense metabolism, so that the imago emerges with the wing-structures, so far from having developed slowly and in the cold, presenting every evidence of rapid change. In a climate like that of England, however, the winter is not cold enough to entirely arrest wing-growth, and hence the spring emergences present usually some evidence of slow change accompanied by gradual growth. It will probably be objected to the above theory, that summer in America is at least as hot as spring, so why do not the summer forms present at least as much evidence of quick change? To which I can only reply, that I am inclined to suppose that the vital structures and organs of generation develop at a much lower temperature than the wings, of which theory confirmation will be seen in such examples as the normally wingless, but otherwise perfect, *Choreius ineptus*, which is said often to develop wings in unusually hot seasons. I hold, therefore, that the North American species hibernating in the pupal state attain a nearly perfect development of their vital functions before the spring, although wing-growth has been in abeyance; but those pupating and emerging in the summer cannot assume the perfect state until the time necessary for the growth of the vital and repro-

ductive organs has expired, so that the wings, developing all the while, have no period of sudden quick change like those of the spring brood. The seasons in Europe were probably at one time much more marked, and possibly some of the Mediterranean species arose as summer forms of northern species, or *vice versa* : for instance, in the genus *Gonopteryx*. *Colias eurytheme*, of North America, has in the summer brood an orange patch on the fore wings similar to that of *Gonopteryx cleopatra*, but the spring emergence has the patch much reduced, and sometimes almost absent, thus resembling *G. rhamni*. Now, supposing the climate were to become more uniformly cold in the north and warm in the south, these seasonal forms would be transformed into geographical races, and ultimately species. Such may have been the origin of *G. rhamni* and *cleopatra*.

(To be continued.)

CONTRIBUTIONS TO THE HISTORY OF THE BRITISH PTEROPHORI.

BY RICHARD SOUTH, F.E.S.

(Concluded from vol. xviii., p. 282.)

As it appears inexpedient to wait until I have found or otherwise obtained all the larvæ of plume-moths I still require for figuring and describing, I venture to complete the imago descriptions of British Pterophoridæ, and, at the same time, append descriptions of such larvæ and pupæ as I have met with since my last contribution. Some of these larval descriptions have already been published, in 'British Pyralides,' by Mr. J. H. Leech. As it may interest those who study the Pterophoridæ, I may add that coloured figures of all our species are given in the work referred to.

Before proceeding with the descriptions, I have a few observations to make respecting some of the species noticed in previous papers.

Platyptilia zetterstedti.

In a former note (Entom. xviii. 172) I remarked that the insect we knew as *zetterstedti* was not Zeller's species of that name, and I further questioned the occurrence of *zetterstedti*, Zell., in this country. In this, however, I think I was partly wrong. I have received other examples of so-called *zetterstedti* from the Continent; the latest additions are from Dr. Staudinger, and all are most certainly referable to *P. gonodactyla*. Now, therefore, it follows that unless Zeller's species is a scarce insect, with which continental entomologists of repute are not well acquainted, and the examples sent me from various sources were all wrongly named, *zetterstedti*, Zell., sinks as a synonym of

gonodactyla, whilst our insect is without a name. I do not, however, propose to invent a new one for it; why, will presently appear; and for the present it will be convenient to refer to it by the name it has borne so long in this country. Among the *zetterstedti* which I took in North Devon is one example, which at the time I thought, from its greater size and more pronounced markings, must be a distinct species. It was figured as probably *P. nemoralis*, Entom. xiv., Pl. I., fig. 19, but I subsequently determined it to be an exaggerated form of *zetterstedti*, believing, as I then did, that that insect was a distinct species. Comparing this *nemoralis*-like specimen again with a more varied series of *P. nemoralis* from the Continent, I cannot now see that there is any material difference between them. The N. Devon insect is perhaps somewhat smaller in size and a little paler in colour than *nemoralis*, but it agrees quite as well with that species as it does with *zetterstedti*, so that, unless it be distinct from either (which I cannot suppose it is), it must be considered an intermediate form, and as such it admirably serves to connect our *zetterstedti* with continental *nemoralis*. The larva of *nemoralis* is said to feed on *Senecio memorensis*; so also, it is stated, does that of *zetterstedti*; therefore it may be that a form of *nemoralis* occurs on the Continent similar to our *zetterstedti*. and that it is this form which is the type of Zeller's species. In the interests of synonymy and exact nomenclature, it will of course be desirable to ascertain which of the insects we know as *zetterstedti* and *gonodactyla* agrees best with Zeller's type of *zetterstedti*. This at the moment, however, I cannot do, but hope to be able to satisfy myself on the point before long; any way, the result of such enquiry cannot affect the conclusion at which I have arrived touching the identity of our *zetterstedti* and *P. nemoralis*, Zell.

Amblyptilia tæniadactyla.

As stated by Mr. Leech ('Brit. Pyralides,' p. 54), my *tæniadactyla* is a variety of our *zetterstedti*. Among a score of the last-named insect, sent me by Mr. Purdy, of Folkestone, were the form I had described and other intermediate forms.

Platyptilia farfarella, Zell. Stett. Ent. Zeit., 1867, p. 334.

IMAGO.—Expanse, 9–10 lines. Fore wing dingy brown, more or less suffused with ochreous; costal triangle, whitish submarginal line, and fringes exactly as in *gonodactyla*, as also are the hind wings.

This insect is probably only a form of *P. gonodactyla*, but not, as I have supposed, peculiar to the second brood of that species. I have several continental specimens, and they are certainly smaller and darker than the usual form of *gonodactyla*, but, as a whole, they are not darker than some of my *gonodactyla*, or smaller than other specimens of that species in my collection.

In fact, one example, bred from a pupa obtained at Southend, is smaller than either of the *farfarella*. In a most interesting account of sundry excursions in Prussian Posen (Ent. Mo. Mag. vi. 48), Prof. Zeller says: "I . . . started from the edge of the ditch a *Platyptilia*, which appears very like *gonodactylus*, but is strikingly smaller, and therefore deserves a close examination, especially since I have found specimens precisely similar in other places. I immediately suspected that there must be *Tussilago* in the neighbourhood, and truly found, on making a more accurate investigation, that a short distance from the spot were a few plants of *Tussilago farfara*, which had established itself here, and which had previously escaped my notice." In a subsequent life-history of *farfarella* by Zeller (Stett. Ent. Zeit., 1870, pp. 310-315), the larva is said to feed in the root-crown and flower-stalks of *Senecio vernalis*; but it has also been stated to feed on the under side of colt's-foot leaves.

Platyptilia isodactyla, Zell.

IMAGO.—Expanse, 10-12 lines. Fore wing: ground colour pale ochreous-brown, with a greyish discal suffusion, and some ill-defined dark brown markings, one of which is a blotch, more or less triangular in shape, situate on the costa; the hind margin is broadly banded with dark grey-brown, margined internally with a line of pale ochreous brown, a black spot at the apex of costal triangle, near the digital juncture; fringes pale grey; tip of outer digit slightly pointed. Hind wing: grey-brown, fringes paler at the base, and with some black scales about the inner margin of third feather, but not forming a distinct tuft, as in *P. gonodactyla* (*trigonodactylus*). Head and thorax colour of fore wings; abdominal junctions paler.

Mr. Barrett says there are two broods of this insect,—one is on the wing in June, and the other in August and September. A description of the larva and pupa, by the late Mr. Buckler, will be found in Ent. Mo. Mag. viii. 154.

Amblyptilia acanthodactyla, Hübn.

cosmodactyla, Hübn.

punctidactylus, Haw.

IMAGO.—Expanse, 8-11 lines. Fore wing dark grey-brown, with a reddish suffusion, a small dark spot on the inner margin between the base and middle of wing, a dark spot about the middle of costa, followed by a blackish costal triangle, a broad blackish fascia traversing both digits, bordered externally by a narrow whitish line, and internally on the outer digit only by an ochreous cloud; fringes whitish, with a tuft of black scales on the middle of inner margin, and a smaller one between this and outer angle; the internal fringes of outer digit are tinged with fuscous. Hind wing dark grey-brown; fringes grey-brown; third feather with a tuft of black scales on its inner margin. Head and thorax colour of fore wings; abdominal junction white. May, June, August, September.

Var. *α*.—Fore wing ochreous grey, with a rosy tinge; markings as in the type, but more clearly defined and with oblique striæ, similar to the same character in *cosmodactyla*, but not so conspicuous. September.

Var. β .—Ground colour of fore wing pale olive-brown spotted with grey, and with oblique grey-brown striæ, in addition to the typical markings. This is known as *cosmodactyla*. July, August, September.

LARVA.—Length, 6–7 lines, when full grown. Ground colour dark green, with the dorsal vessel showing darker. Head pale olive-green, freckled with blackish along the crown and cheeks: mandibles reddish brown. Along the dorsal area are four whitish warts on each segment, from each of which two bristles of unequal length are emitted; subdorsal, two warts on each segment, the anterior of which has two whitish hairs, and the posterior one short hair or bristle; spiracular one dark green wart on each segment, emitting two short whitish bristles. The dorsal and subdorsal series of tubercles are placed on linear yellowish patches; minute blackish bristles are scattered over the entire dorsal and lateral areas. Prolegs blackish; anal claspers semitransparent, with a greenish tinge. August and September. Said to feed on various kinds of plants, but I have only bred the insect from larvæ found on *Stachys* and a garden variety of geranium.

PUPA.—At first of a greenish colour, changing subsequently to an obscure reddish brown; the antenna cases are detached from the abdomen, and there are two conspicuous thorn-like projections on the back. Head truncate. Attached by the tail near a flower-whorl of its food-plant (*Stachys sylvatica*). August and September.

The foregoing descriptions apply to the larva and pupa of var. α , which is probably identical with *stachydalis*, Frey. (Stett. Ent. Zeit., 1871, p. 125). I found larvæ, as well as pupæ and imagines, in a shady corner of Pelham Woods, Ventnor, on the 1st of September, 1883. A specimen of *A. acanthodactyla* from Ireland, which Mr. Percy Russ, of Sligo, was good enough to send me, has reddish brown fore wings, and is the only example I have yet seen of this coloration. Mr. Porritt, who has described the larva of *cosmodactyla* and also that of *acanthodactyla* (Ent. Mo. Mag. xxiii. 133), says that the chief points of distinction between them "are the deep purple ground colour in *acanthodactylus* as compared with the 'purplish pink' of *cosmodactylus*," the white subdorsal lines less conspicuous in *acanthodactyla*, and the head of the latter yellowish brown marked with black, instead of "very dark sienna-brown," as in *cosmodactyla*. I think much value cannot be attached to such very trivial points of difference. I have taken typical *acanthodactyla* at the end of May, but whether these were hybernated specimens or not I cannot positively say, but should suppose that they were. I have only bred the species in September.

Oxyptilus distans, Zell.
var. *lætus*, Zell.

IMAGO.—Expanse, 8–9 lines. Fore wing pale brown, with a small black linear spot and whitish longitudinal dash on the disc, a whitish crescent at the digital junction, and a rather broad whitish band traversing both digits, followed by a narrower whitish band clearly defined on the outer digit; fringes dark brown, variegated with white at the extremities of

the bands. Hind wing golden brown; fringes of third feather whitish at base, and with a tuft of black scales just beyond the middle. June and July.

On the Continent the larva of *lætus* has been found on *Andryala sinuata*, one of the Compositæ, but not a British plant. Dr. Jordan suggests that probably the larva might be found on some species of *Hieracium* in this country. The *Oxyptilus*, occurring at Folkestone and in North Devon, is identical with *lætus*, and I have considered it to be distinct from *distans* (Entom. xv. 35), but examination of an extensive series of *O. distans* has convinced me that I was wrong in my conclusion. The points of difference I relied on will not hold, and *lætus* must sink as a species.

Oxyptilus pilosellæ, Zell.

IMAGO.—Expanse, 8–10 lines. Fore wing ochreous-brown clouded with darker, an ill-defined whitish fascia traverses the outer digit, but is scarcely traceable on the inner digit, beyond this is a whitish line crossing both digits, the enclosed area appearing darker than rest of wing; costa from line to apex with some white cilia; fringes brown, variegated with whitish along the inner margin, at external margin of inner digit, and edges of digital junction. Hind wing dark brown; fringes slightly paler; third feather with some black scales on each side of the shaft near the tip.

Oxyptilus hieracii, Zell.

IMAGO.—Expanse, 8–11 lines. Fore wing dark brown, a white fascia traverses the outer digit, but is not distinctly traceable on inner digit, beyond this is a whitish line crossing both digits; fringes brown, variegated with white or whitish along inner margin, at external margin of inner digit, and edges of digital juncture; costa from line to apex with some pale yellowish cilia. Hind wing dark brown; fringes slightly paler, with a prominent tuft of black scales near tip of third feather, occupying both sides of the shaft.

The foregoing description of *O. hieracii* and also that of *O. pilosellæ* are taken from continental specimens obtained from Dr. Staudinger. I am quite unable to refer to any character by which the one may be separated from the other. *Hieracii* is a darker insect, and the markings are consequently better defined; in other respects it does not appear to materially differ from *pilosellæ*, and I cannot consider it to be specifically distinct therefrom. I have no British example of either insect. Specimens of *O. teucris* have sometimes been sent me as *hieracii*, and large examples of *O. parvidactylus* for *pilosellæ*. *Teucris* may be readily known by the additional black spot at the tip of third feather, separated from the usual tuft of black scales by some white cilia. *O. parvidactylus* has the patch of black scales covering the tip of third feather, whilst in both *hieracii* and *teucris* the black scales are before the tip, and in *distans* nearer the middle than tip of third feather.

Oxyptilus teucarii.

Dr. Mason, who has lately acquired the type of Haworth's *hetrodactylus*, finds that the specimen is identical with *teucarii*, Greening. This name, therefore, must sink in favour of the much earlier one of Haworth's (*vide* Ent. Mo. Mag. xxv. 162).

Oxyptilus parvidactylus, Haw.
obscurus, Zell.

IMAGO.—Expanse, $6\frac{1}{2}$ – $7\frac{1}{2}$ lines. Fore wings dark brown, with some white scales at digital juncture, and two whitish fasciæ traversing both digits, but not always well-defined on the inner digit; fringes dark brown, variegated with white, and two small tufts of black scales along inner margin; also with white on the costa at apex, and at the angle of inner digit. Hind wing dark shining brown; third feather with some whitish scales along its inner margin, and a large patch of black scales covering the tip. May and June.

“The larva feeds in April on the young leaves of *Stachys alpina*; in autumn in the heads of *Marrubium*.”

“The ground colour of the larva is dirty pale green; on each segment are four black warts, bearing a star-shaped tuft of bristles; head and dorsal pale black, the latter divided by a pale line. *Frey*.”—Leech, ‘British Pyralides,’ p. 58.

Mimæseoptilus bipunctidactylus, Haw.
var. *plagiodactylus*, Stainton.
var. *aridus*, Doubleday Cat.
var. *scabiodactylus*, Gregson.

A description of the imago and life-history of this species is given by me (Entom. xviii. 273), under the name of *M. plagiodactylus*. I have a very extensive series of bred and captured specimens of the species, obtained in various British localities. The variation is considerable, and embraces not only the *plagiodactylus* form, but also the pale ochreous var. *aridus*, and the strongly-marked variety first introduced by Mr. Gregson under the name of *scabiodactylus*. These various forms are so closely linked one with the other by intermediates that they must be considered simply varieties of the same species. Some of the forms, indeed, I cannot separate from continental *Mimæseoptili* in my collection, sent me as *M. pelidnodactylus* and *M. coprodactylus*. I am inclined to think that there must be some mistake about the larva of *bipunctidactylus* feeding on *Galium*. I have often disturbed numbers of the imagines from hedges bordering pasture-fields, but have not been able to obtain larvæ from the *Galium* growing in profusion in those hedges. Scabious there is in the pastures, and no doubt the larvæ of *bipunctidactylus* feed thereon, the imagines resorting to the herbage of the hedges for shelter.

Mimæseoptilus zophodactylus, Dup.
loewii, Zell.

IMAGO.—Expanse, 9–10 lines. Fore wing pale grey-brown, slightly tinged with violet and dotted with black scales, a black dot on disc of wing, and another at the lower edge of digital juncture; at the base of the grey-brown fringes are four small black dots, two of which are placed at angle of outer digit, and two near tip of inner digit; costa towards apex whitish, sometimes the entire costa is edged with whitish. Hind wing dark grey-brown. August.

LARVA.—Length, 5 lines, tapering towards anal extremity. Head shining yellowish green, smaller than 2nd segment. Ground colour yellowish green, with a broadish violet dorsal stripe from the 3rd to the 13th segments inclusive; there are numerous short pale grey hairs arranged in four lines along the dorsal and lateral areas, but no well-defined tubercles. Spiracles dark brown. September, in the flowers of *Erythræa centaureum*.

The foregoing description of the larva of *M. zophodactylus* has been already published in Mr. Leech's 'British Pyralides.' Lafaury records larva of *M. zophodactylus* on *Chlora perfoliata*, and suggests that probably it is a miner when young (Pet. Nouv. vii. 532). This species is separable from *M. bipunctidactylus* by its whitish apical edging.

Pterophorus hodgkinsonii, Gregson (E. M. M. iv. 178).

This insect is characterised by Mr. Gregson, as follows:—

“Alar expanse, 7–8 lines. Head, face, thorax, body, and legs light, creamy, ashy-grey, lightest towards the cleft, very slightly irrorated with darker atoms; the discoidal and cleft-spots scarcely perceptible. Under wings rather darker than the upper wings.”

Although not so stated, I apprehend that the “ashy grey, lightest towards the cleft,” &c., refers to the primaries; if this is so, I have some specimens of *M. bipunctidactylus* from N. Devon, which agree very well with the description of *hodgkinsoni*. The time of year fits my insect also, and it differs from the type in precisely the same manner that *hodgkinsoni* is said to differ from *M. bipunctidactylus*. As I have not yet seen a specimen of *hodgkinsoni*, I cannot of course say that it is a form of *bipunctidactylus*, but I think it may turn out to be a form of that species, rather than a var. of *zophodactylus*, Dup.

Leioptilus osteodactylus, Zell.

IMAGO.—Expanse, 9½–10½ lines. Fore wing sulphur-yellow, streaked with brownish from the base to the middle of the wing, a broad ill-defined brownish patch on the costa before the apex, and a black spot at digital juncture; fringes pale brown. Hind wing pale, shining brown. July and August.

LARVA.—Ground colour whity-brown, with a greenish tinge, and thickly sprinkled with minute black dots; dorsal stripe and subdorsal line

pale rosy pink; tubercles inconspicuous, hardly raised above the surface of the skin, two on each segment along dorsal area, from each of which a single brownish hair of moderate length is emitted; these hairs on the 3rd, 4th, and 5th segments curve forwards, those on posterior segments curve backwards; along the lateral area there is one wart with a moderately long hair on each segment. Spiracles black. Prolegs pale brown. October.

In seed-heads of *Solidago virgaurea*. The larvæ hibernated among the dried heads of *Solidago*, some making a snug cocoon-like retreat of the seed-down, others remaining without any such protection; and these assumed a reddish tinge during the winter. Description of larva previously published, 'British Pyralides,' p. 65.

Pselnophorus brachydactylus, Tr.

IMAGO.—Expanse, 10–11½ lines. Fore wing black, sprinkled with ochreous-brown scales, especially on the disc, which seems in consequence to be of a brownish black coloration, a small white dot on costa above digital juncture, from which an ochreous line, sharply angulated at the juncture, runs to the inner margin; fringes black, ornamented with white at the tip of outer and angle of inner digit; there are also some white scales edging the digital juncture, and a patch of white scales on the fringes of inner margin at the termination of ochreous transverse line. Hind wing blackish brown; fringes of second feather grey from base to middle, and white near the tip; there are also some white scales at junction of first and second feathers. Head and thorax colour of fore wings. Abdomen brown, ornamented with lateral white spots. Legs brown; tibiae with one and tarsi with four white marks or rings.

I have not seen a British example of this species. The above description is taken from a continental specimen. The genus *Pselnophorus* was founded by Wallengren for the reception of *brachydactylus* (Ent. Tidskr. ii. 96). The larva is said to feed on the under sides of the leaves of *Prenanthes purpurea*, also on *Lactuca muralis*, in May and June.

"The ground colour of the larva is pale dirty green; dorsal stripe darker, on each side of which is a row of tubercles bearing dark bristles, followed by another row bearing one dark bristle and a few small hairs; a third row occurs lower down, crowned with white bristles. *Frey*."—Leech, 'British Pyralides,' p. 66.

Aciptilia paludum, Zell.

IMAGO.—Expanse, 7 lines. Fore wing deep grey-brown, outer digit traversed by two white fascia-like streaks, edged with some black scales on the costa; fringes grey-brown, with some black scales at the tip and inner angle of outer digit, the latter bordered on each side with white cilia; the inner digit has some black scales at tip; two patches of black scales on the inner margin, the first preceded and the second followed by white cilia. Hind wings grey-brown, darker at the extremity of each feather-shaft, but there are no black scales in the fringes. June to August.

As a British insect, *A. paludum* was at one time supposed to be peculiar to the Cambridgeshire fens, but it has recently been

taken on heathy bogs in one or two localities in Dorset, *teste* Rev. O. P. Cambridge (Entom. xx. 326); it has also been recorded from Woolmer Forest. The larva appears to be unknown on the Continent, as well as in England; at least I cannot find any published description.

SOME NOTES UPON THE VARIATION OF
ARGYROPHINGA ANTIPODUM, DOUBLEDAY.

By W. W. SMITH.

In every country the law of variation operates with greater effect among particular groups and on certain species of Lepidoptera than others; *how* or *why* such should obtain has of late years presented a grand subject for original research to entomologists. In New Zealand, variation is constant to a greater or less degree among many species of both Macro- and Micro-Lepidoptera, and in some species is more marked than others. The case of *Argyrophinga antipodum* exhibits a striking instance of extreme variation among the few endemic species of New Zealand Rhopalocera.

For many years past while out collecting, I have been in the habit of netting great numbers of this butterfly, selecting the more marked forms, and liberating the remainder, on the grassy uplands and plains, still clothed in their native tussock grass (*Poa australis*). This butterfly in its season is generally numerous, and owing to its slow and somewhat laboured flight is easily captured. Among the specimens I have taken are some remarkable varieties, exhibiting all the phases or stages of variation to which a single species could be subject. Many individuals of both sexes differ considerably from each other in their ground colouring, the colours of the neurulation, and in the number of ocelli. The typical colour of the male is given by Mr. A. G. Butler as "dark greyish brown, paler at base;" in my specimens every shade of brown is developed, while some are partially melanic forms. Among the females there is also considerable distinction, the general colouring varying from whitish yellow to rich dark orange. In a typical specimen the hind wings are crossed with three small ocelli, the centre one in the male being slightly the largest; among them are several having a broad blackish band crossing the wing from the inner to the outer margin, and enclosing four distinct ocelli. Others have the three ocelli much enlarged and coalescent, while a number possess only two or one ocelli, and in one specimen (a male) they are obsolete on all the wings. I lately sent a group of these varied forms to the Wellington Museum, where no doubt they can at any time be inspected by entomologists.

Mr. G. V. Hudson, the well-known Wellington entomologist, whom I requested to examine the group, has favoured me with a note regarding them; he considers them "most interesting and instructive," and states that he has specimens from the Nelson province "differing altogether" from them. As Nelson is west of the Alps in the South Island, the fact proves that the variation of the species is nowhere local, but general over the whole extent of the South Island. For many years I have collected in different parts of Canterbury, south of the Rakaia river, from the sea-shore to several thousand feet up the grassy slopes of the Alps; and for three seasons I collected in North Otago, a district which has been under cultivation for over a quarter of a century. After examining the specimens in the Dunedin Museum, captured in other localities in Otago, I think that no locality can be given as producing more varied forms, but that the remarkable variation of the species is unquestionably general over the whole area of the South Island.

As the great question of variation is of vital importance in fully elucidating the science of entomology, it seems to me imperative that entomologists should record the slightest variation in any species when first observed, as in some instances it has now assumed such complexity as to be almost impossible to trace its origin. A thorough knowledge of climatology in all its bearings on the variation of insects is also indispensable to every entomologist. There can be no question that many species of Lepidoptera are greatly influenced in all stages by changes of temperature or by the seasons; and from notes on the variation of this butterfly in relation to the seasons, made during many years, I am in a position to show that the species exhibits greater variation in some years than others. The winter (or wet season in New Zealand) of 1881 was exceptionally dry and mild during the summer, which was even and hot; the butterflies emerged in prodigious numbers, but all the individuals I examined showed less aberration in that year, including the early months of 1882, than any season I can give, before or since. The following winter was much colder, and was succeeded by a fine even summer; but the butterflies were nowhere so plentiful, and many of them, especially the males, were more variably marked than those of the preceding summer. Then followed the wettest winter, and equally wet and coldest summer, on record in New Zealand; every day of bright sunshine produced the emergence of some, and fresh individuals continued to appear until much later in the season than usual. In the same year (the early months of 1884) I collected the most variable forms of both sexes I had hitherto obtained. The close of the year and the first six months of 1885 were the hottest on record; and although the butterflies were plentiful, the greater number I netted were not so variable

or richly marked as in the preceding year. The two succeeding summers produced specimens which were about equal to 1885, as regards their numbers and markings. Last summer, which was preceded by a very wet winter, there was again a greater number of more richly marked and variable forms.

From the foregoing notes it will be seen that the variation of the species is most predominant in seasons succeeding wet winters. The same applies to *Chrysophanus boldenarum*. How the seasons operate in producing this effect requires careful investigation, and any satisfactory solution of this interesting and difficult problem can only, I think, be obtained through such recorded observations. [Vide *ante*, p. 20.—ED.]

One cause in New Zealand which affects the numbers and economy of many species of insects is the annual burning of the Tussock lands. They are fired to promote the growth of young grass, for sheep and cattle depasturing on it. I have no doubt that these terrible fires which occur in the early spring months, sometimes lasting for days, and spreading over many miles of open country, have long ago extirpated many species of insects and rendered others rare. Indeed, it is surprising that *A. antipodum* holds its own so well, seeing that it is in all stages almost exclusively a Tussock-frequenting species.

In the early days of the colony the seasons were more equable than now. The winter rains were more periodical, with less frost; and the summers more even, with fewer chills. The devastating fires, together with cultivation of the land, would soon assert their influence on the climate, and materially affect the economy of Lepidoptera. An abundance, scarcity, or change of food and environment, during the larval stage, is known to produce great variations among certain species; with *A. antipodum*, the finest marked and best-developed forms are evolved in humid seasons, and such succeeding wet winters. The abundance of food which obtains, and an unchecked and vigorous growth of the larvæ during such seasons, would account for this. I cannot say whether natural selection, in the case of the female, "plays many parts in perpetuating the variation of the species," as I have only twice observed them in copula; but in both cases the males were large and richly-marked individuals. Neither am I in a position to say that the tendency to darkening in the colours of the species is, in humid seasons, a case of atavism; but I incline to such an opinion, as the preceding geological period in New Zealand was immensely more humid than the present, a fact which I think favours such a view.

On some future occasion I hope to add a little more on the subject, and to give the life-history of this peculiar butterfly.

East Belt, Ashburton, New Zealand, September 15th, 1888.

DESCRIPTION OF A NEW GOLIATH BEETLE FROM CENTRAL AFRICA.

BY OLIVER E. JANSON, F.E.S.

IN a small but interesting collection of *Cetoniidæ* recently received from the neighbourhood of Stanley Falls on the Upper Congo, I have obtained a male of a very fine species of *Neptunides*, and for the female I am indebted to Mons. R. Oberthür, who has more recently received, and forwarded to me for examination, both sexes collected at Ouganda by Mons. Denoit. I propose naming this fine species after the illustrious leader of the Emin Pasha Relief Expedition and explorer of Central Africa.

Neptunides stanleyi, n. sp.

Elongate, convex, bright golden green, the femora tinged with fiery red, margins of the clypeus, including the horns and median carina, the knees, inner side and apical spines of the tibiæ and the claws, black. Head deeply impressed on each side in front, the impressions divided by a strong, sharp, central carina, which extends from the base of the median horn to the vertex; the median horn stout, recurved and dilated towards the apex, the lateral horns divergent, flattened and rather obtuse. Thorax very convex, subglobose, the sides a little emarginate and scarcely narrowed from the base to the middle thence somewhat abruptly rounded and narrowed to the apex, the surface almost impunctate. Scutellum broad, triangular. Elytra scarcely broader than the thorax at the base, a little narrowed towards the apex, the suture slightly elevated posteriorly, extremely finely and sparsely punctured. Pygidium, underside and legs finely and remotely punctured; mesosternal process flat, broad, rounded at the apex; anterior femora broad, the underside fringed with dense, short, yellow pubescence, and armed near the apex with a large, acute, curved tooth; anterior tibiæ emarginate and obtusely bi-dentate at the base, slightly emarginate on the outer side and grooved on the inner side towards the apex, the apex with two acute teeth on the inside and one behind. Length 36—38 millim.

In the female the head is strongly punctured, impressed behind, and has a longitudinal carina in the centre, the apex of the clypeus has a small and nearly square projection in the middle, and the lateral angles are slightly prominent, the thorax is much less convex than in the male, the elytra have more or less distinct rows of fine punctures, the anterior femora are unarmed, the anterior tibiæ are dilated towards the apex and acutely tri-dentate on the outside, and the intermediate and posterior tibiæ have an acute tooth below the middle. Length 30 millim.

Habitat, Upper Congo District.

The male is larger and proportionately narrower than *N. polychrous* and differs in the uniform colouring of the body, the head is broader, with the central horn stouter and gradually dilated towards the apex, the lateral horns are less curved and more obtuse, the median carina is more prominent and extends to the vertex, and there is no distinct transverse ridge on the forehead

as in *polychrous*; the thorax is also much more convex and less rounded at the sides behind, the anterior femora are broader and have a denser fringe and larger sub-apical tooth, the anterior tibiæ are more dilated near the base, channelled on the inside, and without teeth except at the apex.

22, Perth Road, Stroud Green, N., January 19, 1889.

CONTRIBUTIONS TOWARDS A LIST OF THE VARIETIES OF NOCTUÆ OCCURRING IN THE BRITISH ISLANDS.

By J. W. TUTT, F.E.S.

(Continued from p. 12.)

Xylophasia, St., *monoglypha*, Hufn. (*polyodon*, L.).

This is another most variable species, ranging from specimens of a pale whitish grey ground colour, through almost every intermediate shade to deep unicolorous brown and black. The melanism on our southern coasts tends more to the production of dark, more or less unicolorous, brown forms; that in the North of England, Scotland and the west coast of Ireland to the production more especially of intensely black forms, although occasionally more or less black forms are taken in the south, and beautiful rich brown forms occur in North Britain and the west coast of Ireland. I would also draw attention to the great variation in the direction, shape and size of the orbicular stigma; sometimes this is quite linear, sometimes oval, and sometimes round; sometimes large and sometimes comparatively small.

This species seems to vary but little on the Continent, so far as is at present known, and scarcely any continental authors appear to have figured or described any varieties except Staudinger, who has recently named one intensely black form *æthiops*. Hübner figures the type, with a pale patch along the inner margin and near the anal angle, as *radicea*. The Linnæan description ('Systema Naturæ,' p. 853, No. 170), is as follows:—"Noctua spirilinguis cristata, cinereo-nebulosa; margine postico multidentato." "Alæ superioris margo posticus circiter 8 dentibus terminatus." Guenée in his 'Noctuelles' mentions nothing about the species being variable, although he says, "common everywhere." Haworth describes the pale variegated form, which is generally looked upon as the type, as: "Noctua cristata, alis deflexis dentatis variegatis: striga postica dentatis albis, thoracis crista elevata bifida." "Corpus pergrossum. Alæ anticæ ex fusco parum fulvicantes, nebulis variis nigris pallidisque. Stigma anticum oblongum, et valde obliquum sive subsupinum. Juxta marginem posticum striga profundissime et acutissime dentata alba nigro interne adnata. Posticæ alæ cinereo-fuscæ, fimbriæ

fuscâ, ciliis fulvicantibus." ('Lepidoptera Britannica,' pp. 186, 187). He also adds, "Variat, alis minus variegatis." Thanks to my friend Herr Hoffmann (Hanover), I have been able to get a translation of Hufnôgel's original description, which is as follows:—"With a bluish tinge, partly light and partly dark grey, with a Latin **W** in the hind margin."

Treating therefore as the type the variegated form, which has the whitish blotch on the inner margin, near the anal angle, we have four striking varieties, joined of course by intermediate forms. These are:—

1. A suffused brown or greyish brown form, with the markings distinctly traceable, though obscured, var. *obscura*.
2. A deep, intensely brown form, with the markings scarcely traceable, var. *brunnea*.
3. A black form with moderately distinct markings, v. *infuscata*.
4. An intensely black form with the markings almost entirely obliterated, var. *æthiops*.

α, var. *obscura*, mihi.—A suffused brown or greyish brown form with all the pale markings of the type brownish or dull greyish instead of whitish. The whole of the markings of the anterior wings clearly traceable, although obscured. The brownish transverse lines (pale in the type) margined with darker brown. My specimens have come from Strood, Greenwich, Deal,* Sligo, Barnsley and many North of England and Scotch localities.

β, var. *brunnea*, mihi.—The anterior wings a deep, rich brown, with the discoidal spots and transverse lines traceable. This is almost the same form as *infuscata*, with the ground colour deep brown instead of black. My specimens have come from Mr. Percy Russ, of Sligo, Mr. Henderson, of Glasgow, and Mr. Harrison, of Barnsley. I have also received it from a few other localities, but all northern. Some of my Deal varieties of var. *obscura* approach this form closely. Mr. J. Jenner Weir (Entom. xiv. 220), writing of the Hebridean *polyodon* remarks:—"The parallel variety to *combusta* (*rurea*) is of the richest dark chestnut-colour, very glossy, and, as in the case of *X. rurea*, the intermediate varieties are numerous."

γ, var. *infuscata*, White. This variety was named by Dr. F. Buchanan White ('Fauna Perthensis,' Part. I). It was given to those very dark, black specimens, abundant in Scotland, the North of England, and the West of Ireland, but which are so rare in the South of England. The distinctness of the typical pale markings varies exceedingly, but generally they are distinctly marked in greyish. Mr. G. T. Porritt, in his 'List of Yorkshire Lepidoptera,' p. 74, says:—"The black form, var. *infuscata*, White, is of frequent occurrence, both in the east and west of the county." I have captured it myself at Deal, and have received it from Barnsley, Fleetwood, Hartlepool, Glasgow, Aberdeen, Sligo, and many other localities, chiefly northern. A record of the occurrence of this variety at Tenby is made in the 'Entomologist,' xxii. 15. The variety also occurs freely in

* During the summer of 1888 scarcely a pale *polyodon* occurred on the Deal sand-hills; almost all were *obscura*. I even captured one specimen of var. *infuscata*. I have no doubt this was due to the excessively wet season.

the Orkneys, Shetlands and Hebrides. Mr. C. G. Barrett (Ent. Mo. Mag. vol. xxii. p. 125), reports it as "occurring near Dublin."

♂. var. *athlops*, Stdgr.—This is an extreme development of the var. *infuscata*, White, the whole of the anterior wings intensely black, with no paler markings, and scarcely the slightest trace of any markings whatever; some specimens are perfectly unicolorous. The most perfectly unicolorous specimens I have, are from Mr. Percy Russ, of Sligo, although specimens from the Lancashire coast, Glasgow and Aberdeen, are but little behind them in intensity.

(To be continued.)

A YEAR'S WORK IN PORTLAND.

BY MAJOR CHARLES E. PARTRIDGE.

WHEN a rumour reached us in the autumn of 1887 that the regiment to which I have the honour to belong was to move to Portland in the following spring, our spirits generally fell to zero, for the island bears a bad name. Personally I was delighted, for I looked forward to working great havoc in the insect world. February arrived and my hopes were realised. These, however, were rudely shattered when I first saw the place, for to all appearance it was one huge quarry. A fuller inspection later was hardly more satisfactory, for there was not a sign of the wealth of flowers, herbage, &c., which was soon to appear. The evil reports circulated about the island are by no means exaggerated. The weather is simply atrocious. If it doesn't rain it blows, and when tired of both it fogs; and such fogs too! Worse still, one cannot foretell for an hour how many of these pleasant surprises are in store, the changes come so quickly. Many a time have I left home certain of success, and before reaching the ground all was changed, and I returned home disgusted. I can also speak feelingly of the hardness of the Portland boulders, with which the whole place is strewn. Many an ugly fall have I had, and often have I risen a sorer and sadder man. Owing to these many drawbacks and the really dangerous nature of the ground, Portland can never become a popular hunting ground; and I am confident only those living on the spot can ever hope to work it successfully. Sad to relate, a railway is now in course of construction, further circumscribing an already very limited extent of ground, and before many months are over smoke and an influx of "trippers" will ruin the place, and good local insects will be things of the past.

Owing to bad weather, which on more than one occasion lasted for several weeks, also to the fact that the ivy was so backward that I have not worked it, and last, but not least, to the fact of my being utterly ignorant of the habits, &c., of the *Tineæ*, the following list is far smaller than it would have been in better hands; nevertheless the total number reached 339 species.

Twenty only of the sixty-five species of *Rhopalocera* came under my notice. *Pieris brassicæ* and *P. rapæ* common, but *P. napi*, on the contrary, extremely scarce. *Euchloë cardamines* and *Gonopteryx rhamni* were represented each by a single specimen, as also *Polyommatus phlæas*. *Pararge megæra* and *Satyrus semele* were fairly numerous, *Epinephele ianira* also. *Vanessa cardui*, *V. atalanta* and *V. urticæ* were out in great numbers; but *V. io* I only found in the larval state, and then even very scarce. *Colias edusa* produced but six specimens. *Lycæna icarus* and *L. ægon* swarmed everywhere; and *L. minima*, though local, was by no means scarce. *L. corydon* was occasionally met, though Portland can boast of no chalk. *Nisoniades tages* and *Syrichthus malvæ* occurred but sparingly.

Of the Sphinges I took but three. *Chærocampa porcellus*, two at light. *Macroglossa stellatarum* was rarely met with, and but one larva of *Sphinx ligustri*, though privet abounds everywhere.

The cocoons of *Zygæna filipendulæ* occurred in every direction, each blade of glass having its burden; but of *Z. trifolii* I saw but a single specimen. *Lithosia lurideola* came freely to light, and *Euchelia jacobææ* was common. *Arctia caia* I never saw in the perfect state, and the larvæ but rarely. Of *Spilosoma mendica* I obtained a few larvæ, and *S. lubricipeda* and *S. menthastri* were equally common, both in the larval and perfect states. *Hepialus hectus* and *H. lupulinus* were extremely plentiful, but *H. sylvinus* was represented by one specimen only. *Porthesia chrysorrhæa* and *P. similis* now and then turned up at light. *Bombyx neustria*, but a few larvæ. *B. rubi* was very plentiful in the larva state, each bramble bush having its contingent. *Cilix glaucata* occurred sparingly, but of the second brood I saw but one specimen. Of *Dicranura vinula* I took one pupa and three larvæ on the only poplar, or rather apology for a poplar, in the island. I took two specimens of *D. furcula* at light near the only clump of willows in the island. *Phalera bucephala* a few larvæ only.

I saw but one *Thyatira derasa*, and *Bryophila perla* was fairly common. *Acronycta psi* produced but two imagos. *Leucania impura*, *L. lithargyria*, *L. pallens*, and *L. conigera* swarmed both at sugar and light; but *L. comma* seldom turned up. I got a nice series of *Axylia putris* at sugar. *Xylophasia lithoxylea*, *X. rurea*, and *X. sublustris* were all scarce; but *X. monoglypha* was a perfect pest. Of *Neuria reticulata* I took about a dozen specimens at sugar, but they were out so much earlier than the date given by Newman that I almost missed them. The same remark applies to *Heliophobus hispidus*, which was exceedingly plentiful (I took sixty-four in two evenings). *Neuronie popularis* and *Charcæa graminis* produced but one specimen each, both at light. *Cerigo matura* came freely to sugar, and *Luperina testacea* was easily obtained by searching the grass-stems with a lamp. *Mamestra*

sordida was not scarce at sugar, and by the same means I took two *M. abjecta*; of *M. albicolon* I obtained but three specimens, and *M. brassicæ* was not so common as I expected. *Apamea basilinea* was only too plentiful, but the same could not be said of *A. gemina*; of *A. didyma* I took a long series, with some excellent varieties. *Miana strigilis* was most partial to sugar, and by the same means I got a good series of *M. literosa*; *M. bicoloria* was very abundant. *Grammesia trigrammica* was well represented, though I got but few specimens of the var. *bilinea*. *Caradrina alsines*, *C. taraxaci*, and *C. quadripunctata* occurred commonly.

The Agrotidæ were well represented:—*Agrotis puta*, *A. segetum*, *A. exclamationis*, and *A. corticea* caught at sugar; at the same bait I got *A. vestigialis* and *A. tritici* sparingly; *A. lunigera* was not scarce; *A. simulans* and *A. lucerneæ* were attracted by the blossom of the wild sage; I took one specimen of *A. cinerea* at sugar; and by the same means *A. nigricans*, *A. saucia*, and *A. suffusa*, though not very commonly.

Noctua plecta, a few, both at light and sugar; *N. c-nigrum* and *N. triangulum* were both very scarce; *N. festiva* and *N. xanthographa* both very common; but *N. baia* I seldom came across.

Triphæna ianthina, *T. fimbria*, *T. comes*, *T. interjecta*, and *T. pronuba* were all equally plentiful. Of *Amphipyra tragopogonis* I secured but two. *Pachnobia rubricosa* was plentiful at black-thorn bloom. *Taniocampa stabilis* was very scarce, and hardly less so *T. gothica*. *Anchocelis lunosa* was scarce. *Cerastis vaccinii* and *C. spadicea*, common. *Scopelosoma satellitia* and *Xanthia circellaris*, also *Calymnia trapezina*, four specimens; and *C. affinis* but one. I obtained one specimen of *Eremobia ochroleuca* at teasle bloom, and one also of *Polia flavicincta* at sugar. *Epunda lichenea* I took sparingly, though had I continued to search later I should have had greater success. *Miselia oxyacanthæ* came freely to sugar, and I obtained some good varieties. *Phlogophora meticulosa* was the plague it always is. *Aplecta nebulosa* was very scarce. *Hadena adusta* produced some good varieties; *H. dentina*, a few; *H. trifolii*, not scarce, and *H. oleracea*, very common; *H. thalassina*, but one specimen; and one specimen of *Xylocampa aureola*. *Calocampa vetusta* and *C. exoleta*, but rarely met with. Of *Cucullia umbratica* I took but two specimens, but found the larvæ of *C. absynthii* very plentiful, but very late (many of mine had not gone down at the end of October). *Gonoptera libatrix*, not common. *Plusia gamma* swarmed everywhere; *P. ni* I was lucky enough to obtain once, which was duly submitted to and identified by Mr. Charles Barrett. *Habrostola tripartita* occurred once. *Heliothis peltigera* I took twice, and, oddly enough, both specimens were taken on the same teasle, at an interval of three weeks. *Rivula sericealis* and *Hypenodes costæstrigalis* were fairly numerous.

(To be continued.)

PLUSIA ILLUSTRIS IN IRELAND.

BY G. HERBERT CARPENTER.

AMONG a number of moths taken by Miss Alice Hull, near Castle Kevin, in County Wicklow, in August, 1887, and lately given by her to me for identification, I was greatly surprised to find a specimen of *Plusia illustris*.

The moth is figured in Curtis's 'British Entomology' (vol. xvi., p. 731), published in 1839, and is there recorded as having been taken on Salisbury Plain and in South Wales. Mr. H. T. Stainton has most courteously informed me that these captures took place before 1810, and that the insect has never since been seen in Britain. Both he and Mr. de V. Kane agree that it is quite new to Ireland.

The insect is admitted by Humphreys and Westwood into their 'British Moths' (1843). It is to be found among the reputed British species in the Doubleday List, but in Mr. R. South's List it is refused a place even among these. Its re-appearance in our islands, after so many years, is therefore a noteworthy fact. It seems very strange that, if Miss Hull's specimen is a migrant from the Continent, no individuals have been taken in Great Britain. On the other hand, it is equally strange if the insect has been breeding among us unnoticed for over seventy years. The ordinary food-plants of the caterpillar, *Thalictrum aquilegifolium* and *Aconitum lycoctonum*, are both confined to the Continent. *T. minus*, however, occurs sparingly on the Wicklow coast, and species of both genera may very possibly be cultivated in the locality.

Science and Art Museum, Dublin, January 14, 1889.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

VANESSA ANTIOPA IN KENT.—About the middle of September, 1888, a worn specimen of *Vanessa antiopa* was captured by a gentleman with his hat, while it was at rest on a gooseberry bush in his garden near this place.—JOHN TYRER; 27, Jeffry Street, New Brompton, Kent.

DIMINUTIVE POLYOMMATUS.—On September 13th I took at Sandy, in Bedfordshire, a very small specimen of *Polyommatus phlæas*. The insect does not measure more than ten and a half lines across the wings.—HENRY A. HILL; 20, Fellows Road, Hampstead, N.W., November 4, 1888.

ABSENCE OF LYCENIDÆ.—In Mr. Adkin's article upon the influence of meteorological conditions upon insect life (Entom. 7) reference is made to the absence of a second brood, in 1888, of *Lycana bellargus*. During the past fifty summers in which I have collected, on and off, in the neighbourhood of Chatham, I have never, until last autumn (1888), missed

seeing the second brood of this butterfly. Although I carefully searched, for over two months, all our local downs, warrens and chalk-pits, I failed to find a single specimen of the autumn brood of either *L. bellargus*, *L. astrarche*, or *L. minima*. *L. corydon* was plentiful in August. It would be interesting to know whether this absence has been general, or only local; also whether the pupæ, which should have produced the second brood, are lying over to form the first brood for next year.—JOHN TYRER; 27, Jeffry Street, New Brompton, Kent.

THECLA W-ALBUM IN OXFORDSHIRE.—In 1868 I discovered a locality in South Oxfordshire for *Thecla w-album*. So abundant was it then I could have taken very large quantities. The spot specially selected by them was a considerable clearing in a beech wood, where plenty of brambles grew. I remember well the great numbers attracted by its bloom. Some of the examples I then took I have still. I have never visited (owing to long absence) the spot since for *T. w-album*, till last July, when Mr. William Holland and myself went to my old collecting-ground, hoping to re-discover its haunts. Instead of the spacious clearing which once existed, a remnant alone remained, some twenty yards square; the rest was ploughed land, but on and within a few yards of the small part left we netted nearly fifty specimens. Considering the old habitat had been nearly destroyed, we thought ourselves exceptionally fortunate in securing so many. These are, I believe, the only recorded captures of *T. w-album* in Oxfordshire, and if so, adds another butterfly to the county list. I may add that wych-elm grows sparingly among the beech at one end of the wood.—J. CLARKE; Reading, January 9, 1889.

DEILEPHILA GALII IN LANCASHIRE.—On July 27th I caught a specimen of *D. galii* here, flying over some white campion at dusk. Next day my son caught another, some two miles farther north, flying over some rest-harrow, at 11 a.m., in bright sunshine. One of the boys caught another at dusk, on some honeysuckle. During the latter end of September, I was lucky enough to find seven larvæ at Lytham, and on Sept. 27th Mr. Irving, the head master of this school, found one in the grass in front of the school here. These localities range over a stretch of about four miles along the Lancashire coast.—T. BAXTER; Collegiate School, St. Anne's-on-the-Sea, *via* Preston.

SESIA MUSCIFORMIS IN SCOTLAND.—I took about a dozen pupæ of the thrift clearwing, on the Scotch coast, in June last. — W. R. SCOWCROFT; Fern Lea, Gardner Road, Prestwich.

LITHOSIA COMPLANA ON THE COAST.—In reply to Mr. Jeffery's note (Entom. xxi. 322). I may say that as several years ago I bred *L. complana* from the larva, it evidently frequents the coast, and feeds on stone-lichens. I have had two larvæ since, but was not fortunate enough to bring them through. — W. R. SCOWCROFT; Fern Lea, Gardner Road, Prestwich, Manchester.

FOOD OF LITHOSIA COMPLANA.—With respect to Mr. Jeffrey's query (Entom. xxi. 332), I find the following note in 'Entomologist's Weekly Intelligencer,' vii. 188;—" *L. complana*. Bred from four larvæ found feeding on lichens on decayed ash. They did not answer to the description given in

the 'Manual,' but precisely resembled those of *complanula*. Except that the broad orange-coloured lateral stripe was interrupted by the ground colour, giving it the appearance of a row of large orange spots." This passage was written in 1860, and as the writer, Dr. Allchin, then a well-known lepidopterist, on the same page states that he also bred three *lurideola* (*complanula*), it is probable that he was correct in his species. *L. complana* is, certainly, both a coast and inland species. The first specimen I ever took was from the New Forest; it flew up at my feet from amongst heath, quite half a mile from any trees. For the past few years I have found it fairly abundant on the heaths in this neighbourhood, in most cases quite away from any trees that had any lichen upon them. Now the heaths about here are very thickly carpeted with lichens, which in places almost smothers the growth of *Calluna*, *Erica*, &c., and this peculiarity appears also to those in the New Forest. I have not the slightest doubt but, that in the above localities, the usual food-plant is one or more of these ground-lichens. During August, 1887, I found this species commonly on the sand-hills near Shoeburyness, in Essex (Entom. xx. 224). At the time I did not look for a probable food-plant, but on a subsequent visit during September this year (whilst on a successful hunt for larvæ of *Deilephila galii*) I found the ground on which I had captured the specimens of *complanata* thickly carpeted with moss. This I should consider to be, in this locality, its probable food-plant. I have never worked the Deal sand-hills at the time when the species would be flying, but possibly the spot resembles that of Shoeburyness in this particular. I quite agree with Mr. Tutt that species of this family, in some instances, are able to exist upon other food than lichens. I have seen females of *L. pygmeola* in abundance in spots where no lichen, moss, or in fact anything other than marram grass and sand occurred.—W. G. SHELDON; Rose Cottage, Oval Road, Addiscombe, January 7th, 1889.

[I have found *Lithosia caniola* feeding upon *Lotus corniculatus*, at Howth, in Ireland.—JOHN T. CARRINGTON].

TEPHROSIA CREPUSCULARIA: CORRECTION.—Mr. Adkin's note on the "Influence of Meteorological conditions upon Insect Life" (Entom. 7) has called my attention to an error which has crept into the few remarks which I recently made upon the subject (Entom. xxi. 283). The date there given for my capture of *Tephrosia crepuscularia* should have been May 5th, not July 5th.—GEO. C. GRIFFITHS; 1, Hale Bank, St. Matthew's Road, Cotham, Bristol, January 7, 1889.

AGROTIS CORTICEA, MELANIC VARIETY OF.—With reference to Mr. Tutt's remarks at p. 15, *ante*, I beg to call attention to p. xxxii. of the 'Proceedings' of the meeting of the Entomological Society of London, on October 3rd, 1888, which Mr. Tutt appears to have overlooked. It is there stated that "Mr. H. Goss exhibited, for Mr. W. J. Cross, an extraordinary melanic variety of a species of *Agrotis*—believed to be either *segetum* or *corticea*—caught by the latter near Ely, in July last." Mr. Tutt may probably be right in his determination of the species to which the variety in question belongs; but his opinion differs from that expressed by Mr. Jenner Weir and Mr. W. Warren. I believe it was correct to apply the term "extraordinary" to the variety in question, which is not a constant variety of general distribution nor a local form; but it is probable

that the use of the term "extraordinary" was, to some extent, prompted by a desire on my part to please Mr. Cross, by leading him to suppose that his capture was of more than ordinary interest.—H. Goss; Berrylands, Surbiton Hill.

AGROTIS AGATHINA, &c.—With respect to the question of Mr. Butler (Entom. 15), as to the usual way to capture this species, it is, as Mr. Carrington says, by searching the flowers of *Calluna vulgaris* with a lamp at night; but after some experience, I am decidedly of opinion that there is even a better way, if indeed one could but master the initial difficulty. I first commenced to search for *A. agathina* on the Shirley Hills in 1885; in that season I could not find it; in 1886 I got three specimens; in 1887, eighteen; and last year, one only. It is probably well known to most readers of the 'Entomologist,' that it was the custom of the London collectors of the last two generations to come to Shirley, especially for this species, and I have been repeatedly told that fifteen or twenty years ago the larvæ could be swept from heather in the spring in hundreds, together with those of *Noctua castanea*, *Scodion belgaria*, *Aspilates strigilaria*, &c. It is very different now, and the curious circumstance is, that whilst *A. agathina* and the two Geometers are very rare, *castanea* appears to be quite as common as in the old days. As above stated, I searched unsuccessfully for the species during 1885, and for several evenings in 1886, until one night I turned my lamp upon a fine bush of bloom and saw a sight that electrified me: there were two *agathina* and one red *castanea* upon it; the *agathina* were apparently quiet, and merely noting that they were male and female, I proceeded to box my *castanea*, which was just on the point of leaving. Having effected my object, I turned back to where the *agathina* should have been and found them gone, but within six feet of the spot I got three other specimens, all males. In the following year, after several nights unsuccessful work, I took a freshly-emerged female. Mindful of my former experience, I searched well the heath round her, and found within a small space, five males. A few nights after this, I took four specimens close together, males again, and have no doubt there was a female in the neighbourhood. I feel certain that if a virgin female was bred and placed in a muslin-covered box, amongst the heather, in a locality where the species occurred, she would attract to her, freely, the males; but there is the rub! the successful breeding of *agathina* has been solved by but few, and it is no easy thing to obtain one. I believe the species has been bred somewhat freely, of late years, by some of our Scotch collectors residing at Perth, and possibly they may have tried assembling for it. Perhaps they will give us their experience in capturing the species.—W. G. SHELDON; Rose Cottage, Addiscombe.

DASYCAMPA RUBIGINEA IN SOMERSET.—On November 13th last, I took a fine and fresh specimen of this moth at ivy. A careful search on several succeeding evenings failed to discover another. This is the second I have taken in this county.—(Rev.) J. SEYMOUR ST. JOHN; Baltonsborough, Glastonbury, November 20, 1888.

AMPHIDASYS BETULARIA, VAR.—Mr. J. Arkle says (Entom. xxi. 316), that while collecting in the Delamere Forest, he came across a matter which has been considered of some importance, viz., a type female and a black male of *Amphidasys betularia* in copula. I may say that similar unions

have been commonly observed in this neighbourhood, where the black variety is taken as freely as the ordinary type. Some years ago, when I was a member of the Middleton (Lancashire) Entomological Society, two of the members found a black male and a buff female united. These were two extreme varieties, and from this copulation many pure buff varieties, as well as jet-black ones, were produced. For several years, offspring of these insects were brought to the monthly meetings, showing variation in every form, from the ordinary type to a pure buff, as well as black. It was most interesting to see these insects, some of which were exhibited alive. I had myself a few larvæ from these parents given to me, from which I raised two buff varieties, one of which I gave to a friend.—J. T. RODGERS; 45, Radcliffe Street, Busk, Oldham, Manchester, December 19, 1888.

EXTRACTION OF MOTH FROM PUPA.—I have just read, with much interest, Mr. J. Anderson's note on the extraction of a moth from its pupa (Entom. xxi. 236), having made several experiments of the same nature myself with, however, quite opposite results. In 1880 I carefully extracted a fully developed specimen of *Amphidasys betularia* from the pupa, and although the markings were all clearly discernible, the wings never expanded to a larger size than they were while the insect was in its pupa. In October, 1887, I had about ten pupæ of *Charagia virescens* amongst damp moss. These insects always have considerable difficulty in emerging when in captivity, as in their natural condition they are in the habit of only projecting the anterior portion of their body from the burrow in the tree, the spines on the abdomen of the pupa retaining the old case firmly, while the enclosed insect draws itself out. I am therefore always very anxious about these pupæ, especially as they are very hard to obtain, and have consequently been led to extract several which had been endeavouring to emerge for some days previously; in all these cases, however, the wings never expanded, the insects so treated being completely useless. That the moths were quite mature there could be no doubt, as I always waited until the thoracic plates were ruptured before I attempted to assist the moth. As I have made at least eight experiments, including one this month on *C. virescens*, I cannot but think that Mr. Anderson's results must be exceptional.—G. V. HUDSON; Wellington, New Zealand, October 17, 1888.

RETARDED DEVELOPMENT.—Early in June I received some young larvæ of *Bombyx castrensis* from a friend. Two larvæ are still feeding, though the others have long since pupated. Last month I took over eighty larvæ of *Anarta myrtili* on the Quantock Hills, and a few are yet left feeding. In my garden I have a number of larvæ of *Pieris brassicae* in various stages, while but four days ago, an imago of *Plusia gamma* emerged from a pupa in my cage. In 1886 I had some larvæ of *Lophopteryx cuculla*, which duly fed up and turned into pupæ. All but two emerged in June of last year. Of these two, one emerged the following 3rd of September, and the other on May 14th last.—(Rev.) J. SEYMOUR ST. JOHN; Baltonsborough, Glastonbury, November 20, 1888.

CIDARIA RETICULATA: ERRATUM.—Mr. Murray desires it to be understood that he has had poor success in rearing *C. reticulata*, whereas (Entom. 16, line 8) he was made to say that he had never reared that species.—[ED.].

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON. — *The Fifty-sixth Anniversary Meeting, Jan. 16, 1889.* — Dr. D. Sharp F.L.S., President, in the chair. An Abstract of the Treasurer's Accounts, showing a balance in the Society's favour, was read by Mr. Osbert Salvin, F.R.S., one of the Auditors; and Mr. H. Goss read the Report of the Council. It was announced that the following gentlemen had been elected as Officers and Council for 1889:— *President*, the Rt. Hon. Lord Walsingham, M.A., F.R.S.; *Treasurer*, Mr. Edward Saunders, F.L.S.; *Secretaries*, Mr. H. Goss, F.L.S., and the Rev. Canon Fowler, M.A., F.L.S.; *Librarian*, Mr. Ferdinand Grut, F.L.S.; and as other Members of Council, Mr. Henry W. Bates, F.R.S.; Capt. H. J. Elwes, F.L.S.; Mr. William H. B. Fletcher, M.A.; Mr. F. DuCane Godman, M.A., F.R.S.; Prof. Raphael Meldola, F.R.S.; Dr. Philip B. Mason, F.L.S.; Mr. Osbert Salvin, M.A., F.R.S.; and Dr. D. Sharp, F.L.S. Dr. Sharp, the outgoing President, then delivered an Address, for which a vote of thanks to him was moved by Capt. Elwes, seconded by Mr. Salvin, and carried. A vote of thanks to the Treasurer, Secretaries, and Librarian was moved by Mr. J. W. Dunning, seconded by Lord Walsingham, and carried. Mr. Saunders, Mr. Goss, and Mr. Grut severally replied.—H. Goss, *Hon. Secretary*.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY. — *December 27th, 1888.* T. R. Billups, President, in the chair. Messrs. F. E. Fenton, F. P. Perks, J. Scudder, and W. Reed were elected members. Mr. F. E. Strong exhibited full-fed larvæ of *Bombyx quercus*, L., from Abergele, N. Wales, and made some remarks thereon. Mr. R. Adkin, a long series of *Pygæra anachoreta*, and remarked that Mr. Gregson, in a recent article on this species, suggested that the continental specimens were readily distinguishable from British by their ashy grey shade. The series now exhibited were all bred from one stock, and varied from a brown tinge to the most ashy grey tints; the exhibitor therefore thought that too much reliance should not be placed on the shade of colour. Mr. Billups read a paper, "A partial list of Parasitic Ichneumonidæ, with the hosts from which bred, reared during the last three years by a few members of the Society." The list comprised about 100 species, numbering some thousands of specimens, many of the species being evidently new. Mr. Billups expressed a wish that members would assist him in identifying parasites of Lepidoptera, by saving all that they might breed during the coming season.

January 10th.—The President in the chair. Mr. Adkin exhibited *Noctua glareosa* from Kent, Barnsley, York, Perth, Forres and Shetland; the Shetland specimens and one of those from Perth were melanic, the others being of the pale grey or slightly rosy type. Mr. J. A. Clark, dark varieties of *Cidaria suffumata*: black and a suffused form of *Melanthia bicolorata*; and a fine banded variety of *Oporabia dilutata*. Mr. Tugwell, a series of *Boletobia fuliginaria*, with an empty pupa-case and sketches of larvæ at rest and feeding; and contributed notes in which he stated that in his opinion the insect was a true Geometer rather than a Noctua. Mr. White exhibited a coloured drawing of a variety of *Catocala nupta*, having the inferior wings blue, taken by Dr. Laver, at Colchester. Mr. E. Joy, bred specimens of *Pygæra pigra*, from Wicken Fen. Mr.

Chiltenden, very black forms of *Acidalia inornata*, taken near Ashford, Kent. Mr. Jenner Weir exhibited, with other species, a female specimen of *Anosia plexippus*, which he had received from Mr. Cockerell, Custer Co., Colorado, and stated that although in this specimen the inner edge of the wing was quite as black as those received by him from Canada and Hudson's Bay, it yet differed in the colour of the spots on the fore wing being all white, whereas in the northern specimens the four large central spots were of a fulvous brown, little inferior in richness to that of the disc of the wing. At the same time he showed a water-colour drawing, of the specimen taken at Lindfield, 1876, from which it appeared that the example then captured resembled the more northern form of the species. Male and female specimens of *Pieris oleracea* were also exhibited by Mr. Weir, who said he had always contended this species was not identical with *P. napi*; and he had received a communication from Mr. Scudder, who wrote that he had now been able to make the comparison wished, and could report that the two species were distinguishable from each other in the caterpillar and chrysalis stages, as surely and readily as *P. napi* and *P. rapa* could be distinguished in the same stages. Mr. T. R. Billups exhibited types of eighty species of Hymenoptera, parasitic on Lepidoptera, with cocoons from which some had emerged, and larvæ from which several parasites had been reared.

OBITUARY.

THOMAS EEDLE was born at Pinner, Middlesex, June 13th, 1829, and died on the last day of 1888. From his earliest youth he showed an innate fondness for Nature, and especially for her subjects in their homes. A few years ago, one of our popular writers belauded the works of a Scotch naturalist, who at best was but a *dilettante*. Mr. Smiles need not have gone so far north for a subject, for none would have suited him better than Thomas Eedle. Such he was,—painstaking, observant, and most generous in helping young students; for though he made his study his business, he never withheld a locality, nor a bit of useful knowledge, “for trade purposes”; although first a lepidopterist, he took an all-round interest in Natural History, nothing coming amiss to him. In 1869 and 1870 Mr. Eedle made two very successful excursions to Rannoch, in Scotland, where he took a specimen of the then very rare *Pachnobia hyperborea*, the second specimen which had been found in Britain. In 1871, Lord Walsingham took the subject of this notice with him on his visit to the Western States of America, when Eedle acted as collector and assistant during his Lordship's explorations until 1872. On his return, Eedle collected for Lord Walsingham in Horning Fen and elsewhere. While in the fen he captured a long series of *Vanessa antiopa*, probably the largest take of that species in this country in modern times. In 1874 he made a third summer's stay in Scotland, after which he settled steadily to his business of taxidermist and dealer in Natural History subjects. Among his larger work is some in the museums of the Marquess of Ripon, Lord Walsingham, and others. Much that is known of several of the rarer Lepidoptera of the Home Counties is due to Eedle, especially of such species as *Erastria venustula*, *Chrosis bifasciana*, *Hypercallia citrinalis*, *Aleusis pictaria*, &c. He was a founder of the Haggerston Entomological Society, and was generally respected for his unassuming manner and great experience.—J. T. C.

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DESCRIPTION OF A NEW SPECIES OF *ARCTIIDÆ* FROM NEW ZEALAND.

By G. V. HUDSON.



METACRIAS STRATEGICA.

THE following species of *Arctiidae* was taken, February 10th, 1881, by Mr. W. W. Smith, near the summit of the Richardson range, in South Canterbury, and not far from the town of Albury. It was beaten out of some plants of *Carmichaelia*, at an elevation of about 3000 feet, but further particulars relating to its habits are at present unknown; the only specimen as yet in collections being the one from which the accompanying description and drawing was taken.

I am indebted to Mr. Meyrick for informing me that the species is new, and also referring it to the correct genus *Metacrias*. He has likewise been kind enough to point me out the differences between this insect and the two others of the same genus, which I give briefly at the end of the description.

Arctia (Metacrias) strategica, n. s.

♂. Expanse of wings 17 lines. Antennæ dull yellow, with articulations marked in black. Head black, with a small tuft of ochreous scales in front. Legs ochreous, striped longitudinally with black. Thorax black, the margin of the prothorax indicated by a yellowish collar; mesothorax with a very broad yellow stripe on each side. Forewings, with costa, nearly

straight, black, with six longitudinal ochreous lines; the first almost imperceptible, extending interruptedly only about one-sixth from hind-margin towards base; the second traversing the whole of the wing uninterrupted throughout, and broadest on disc, slightly curved downwards towards hind margin; the third much broken, and terminating at about one quarter from hind margin; also the fourth and fifth, which are, however, a little longer; the sixth very broad, extending from hind margin to base of the wing. Costa and inner margin edged with ochreous. Hind wings with a broad sub-marginal band of black, terminating shortly before anal angle, a large black dot being situated in the anal angle, yellowish ochre, tinged with red in the vicinity of the black band. Hind margin brilliant crimson, except at anterior angle, where black band extends to the edge of the wing; cilia of both wings ochreous. Abdomen black, with long ochreous hairs. Beneath, all the wings are yellowish ochre, with their margins broadly edged with black, and tinged with red near the edges. A conspicuous reddish stripe in the disc of each wing, and also a minute discal dot, which is quite invisible on the upper surface. Female unknown, but probably apterous.

This species chiefly differs from the two others belonging to the genus *Metacrias* in possessing the yellow collar, the absence of any large discal spot on both fore wings and hind wings, and the red colouring of the posterior margins of hind wings. The two other species (*Metacrias erichrysa*, Meyr., *M. huttonii*, Butler), are described by Mr. Meyrick, in the 'Proceedings of the Linnean Society of New South Wales,' 1886.

Wellington, New Zealand, November 8, 1888.

ON THE VARIATION OF INSECTS.

By T. D. A. COCKERELL.

(Continued from p. 29.)

1. *Suffusion and Melanism.*

Limenitis sibylla nigra, Entom. 1878, 101, quite black. (See also Newman, p. 67; and Ent. Mo. Mag., 1877, 89). *Melanargia galatea turcica*, B., Entom. 1878, 101, black, or nearly black. *M. galatea procida*, Hbst., "var. obscurior" (Staudinger). *Eupithecia albipunctata angelicata*, Prest, Barrett, Entom. xi. 170, with fig. *Vanessa cardui semisuffusa*, hind wings smoky. Entom. xi. 24. *V. cardui elymi*, Rbr., "maculis confluentibus." *Argynnis euphrosyne fingsal*, Hbst., "minor, obscurior" (Boreal Europe). *A. selene hela*, Stgr., "minor, supra obscurior" (Lapland, Siberia). *Pieris napi bryoniæ*, Ochs., "ab. ♀ obscurior" (European Alps, Alaska). *Nemeophila plantaginis matronalis*, Frr., hind wings almost entirely black. *Callimorpha dominula persona*, Hb., hind wings dark. *Spilosoma fuliginosa borealis*, Stgr., smaller and darker. *Hepialus velleda gallicus*, Ld., "♂ unicolor fuscus."

Cænonympha darus, dark form in Shetland Isles, Newman Brit. Butt. 97. *Colias edusa suffusa*, Ent. xi., Newman Brit. Butt. 144. *C. philodice suffusa*, Massachusetts, Maynard, Butt. of New Eng., pl. vii., fig. 57c. *Pieris brassicæ nigrescens*, Newman Brit. Butt. 165. *Cirrhædia xerampelina obscura*, Entom. xvi. 236. *Eubolia plumbaria nigrescens*, Entom. xvi. 138. *Melanthia albicillata suffusa*, Carrington. *Hybernia defoliaria suffusa*, Ckll. *Chelonia caia obscura*, Newman, Brit. Moths, 33; Entom. xi. 103. *Abraxas grossulariata obscura*, Newman, Brit. Moths, 100. See also Entom. 1887, 216, for a grey variety. *Melanippe hastata nigrescens*, tom. cit. p. 157. *Acronycta rumicis obscura*, id. p. 255; and *A. menyanthidis salicis*, Curt. *Xylophasia monoglypha nigrescens*, id. p. 285. *Satyrus alope maritima*, Edw., a small and dark maritime form (Long I. &c., United States). *Larentia olivata semisuffusa*, Proc. S. Lond. Ent. Soc. 1886, 53, pl. 1, fig. 1. *Amphidasys betularia doubledayaria*, Mill. *Diurnea fagella*, melanic varieties now prevalent at Huddersfield, Ent. Mo. Mag. 1887, 140. *Anoploclera sexguttata niger*, Entom. x. 214. *Pterostichus cupreus niger*, Entom. xii. 110 (T. H. Hart). *Lema melanopa nigra*, and *L. cyanella nigrescens*, loc. cit. *Sphecodes gibbus niger*, ♂, and *S. ephippium niger*, ♂, near Hastings, Entom. xi. 17.—Melanism is a subject that comes up periodically and causes considerable discussion, but is nevertheless very far from being settled. I have expressed the opinion in a former paper that dampness in the atmosphere—clouds, mists, and so on—has a great deal to do with its production, yet I confess that it is probable that other factors are also at work. I have given a good long list above, but it really represents only a very small fraction of the known forms of this kind, and I have tried to make it as representative as possible. In connection with this list the following facts will be noticed:—

1. The small number of American examples: it appears certain that melanism as usually seen in Europe is rare in North America, a circumstance that is strongly against the theory of its being caused by cold. "A straw will show which way the wind blows," so it is interesting that, according to Mr. R. H. Meade, one of the chief points of difference between American and European species of *Sarcophaga*, is that in the former the anal segments are generally red or yellow, while in the latter they are black or grey. The species of this genus I have taken in Colorado have the anal segments red or reddish, confirming this statement.

2. The alpine forms: dark mountain varieties are well known throughout Europe. Mr. A. H. Swinton (Ent. Mo. Mag. 1885, 231) remarks on the melanic tendency exhibited by Asturian mountain insects, particularly the Orthoptera. Here in Colorado the species of *Colias* found high upon the mountains (10,000 ft. upwards) is of so much darker a yellow than the species occurring

lower down (8000 ft.), that I did not recognise it as belonging to the genus when on the wing.

3. Maritime melanism: Wollaston says that *Chrysophanus phloeas* is darker and more suffused in Madeira (where it cannot escape from the neighbourhood of the sea) than in England. *Aphodius plagiatus* usually has red dashes on the elytra on the Continent, but all those from Deal were perfectly dark, which indeed is the prevalent tendency with British specimens of this species ('The Variation of Species,' p. 61).

4. Melanism apparently confined to one sex: a further example of this is *Parnassius apollo hesebolus*, Nordm., which Staudinger describes as "v. major, ♂ albidior, ♀ obscurior.

5. The darkening is sometimes confined to the hind wings; examples are given in *Vanessa*, *Nemeophila*, and *Callimorpha*.

6. The recent development of a melanic race of *Amphidasys* in the manufacturing districts is well known, and from Mr. Porritt's remarks on *Diurnea* at Huddersfield, this seems to offer a similar case.

7. Northern melanic forms: it is an error, however, to suppose that all northern forms have a tendency towards melanism. Dr. F. Buchanan White, in an extremely interesting article (Ent. Mo. Mag. 1876, 145), gives a number of species which are generally or always "melanochroic" in Scotland, but also at the same time enumerates many examples of Scotch "leucochroism," showing that in a few species all the specimens are paler than in the south, while in others there is a general tendency that way. In America, *Terias lisa* is said to be paler in the north than in Florida.

ERRATUM.—Page 4, line 2 from bottom, for "*helice pallida*" read "*hyale pallida*."

(To be continued.)

A YEAR'S WORK IN PORTLAND.

BY MAJOR CHARLES E. PARTRIDGE.

(Concluded from p. 45.)

Uropteryx sambucaria flitted about over the blackberry bloom at night in great numbers. *Venilia macularia*, *Selenia bilunaria*, *Rumia luteolata*, *Boarmia repandata*, *B. gemmaria*, *Abraxas grossulariata*, *Larentia didymata*, *Melanthia ocellata*, *M. galiata*, and *M. fluctuata* occurred everywhere. *Odontopera bidentata*, *Hibernia rupicaprararia*, *Acidalia ochrearia*, *Asthena candidata*, *Acidalia rusticata*, *Ligdia adustata*, occurred very sparingly. *Acidalia degeneraria* came freely to light, as also did *A. remutaria*, *A. aversata*, and *A. marginepunctata*. *Gnophos obscuraria* swarmed at the blossom of wild sage, and *Larentia olivata* and *Anticlea rubidata*, though local, were easily obtained. Of *Melanippe*

rivata, *M. montanata*, *Acidalia subsericeata*, *Coremia ferrugata*, *C. designata* and *C. unidentaria*, *Anticlea badiata*, *Larentia multistrigaria*, *Hyppipetes sordidata*, I obtained but very few specimens, but *Acidalia bisetata* and *A. trigeminata* were very common.

Eupithecia pumilata and *E. rectangulata* occurred very commonly at blackthorn bloom. *E. coronata* on apple trees, and *E. absynthiata* and *E. vulgata* at light. *E. pimpinellata*, *E. castigata*, and *E. oblongata* were not uncommon. *E. isogrammaria* was scarce. *E. constrictata* when once found was fairly plentiful. *E. subnotata* common. Of *Triphosa dubitata* and *Cidaria prunata* I took but two specimens. *C. truncata*, *C. fulvata*, and *C. dotata* were equally scarce. *Camptogramma bilineata*, *Eubolia limitata*, and *E. bipunctaria*, were of frequent occurrence. *Anaitis plagiata* occurred but once.

Cledeobia angustalis, *Pyrausta purpuralis*, *Herbula cespitalis*, *Scopula olivalis*, and *S. prunalis*, occasionally occurred. *Ennychia cingulata* was both local and scarce.

Nomophila noctuella, *Scopula ferrugalis*, *Spilodes verticalis*, *Stenia punctalis*, *Pionea forficalis*, were generally distributed and common. *Eurrhypara urticata* occurred but sparingly. *Platytes cerussellus*, *Crambus pratellus*, *C. culmellus*, and *C. hortuellus* were a positive pest. Of *C. inquinatellus* I took but two specimens. *C. geniculeus* was fairly numerous. *Aphomia sociella*, *Oncocera ahenella*, *Ilithyia semirubella*, *Ephestia elutella*, came to light, as also did *Rodophæa marmorea*.

Homæosoma nebulella produced but one specimen. *H. sinuella* and *H. binævella* were common, but *H. nimbella* not so much so. *Phycis ornatella* was not scarce. Of *Euzophera cinerosella* I took but one. *Scoparia cembræ* and *S. ambigualis*, occurred freely, but this year *S. mercurella* and *S. phæoleuca* and *S. angustea* were hard to procure.

Botys asinalis was not to be found in its usual haunts.

Tortrix podana, *T. ribeana*, *T. heparana*, *T. forsterana* were all very common. *Peronea variegana*, *P. aspersana*, were not very abundant. *Teras contaminana* plentiful. *Dictyopteryx holmiana*, *D. bergmanniana*, *D. forskaleana*, *A. conwayana*, *Spilonota trimaculana*, *Pardia tripunctana*, *Aspis udmanniana*, *Sericoris cespitana*, *S. urticana*, *S. lacunana*, *Cnephasia musculana*, *Sciaphila subjectana*, *S. virgaureana*, and *Sphaleroptera ictericana*, the same. *S. conspersana* more rarely met with. *Grapholitha trimaculana*, *G. nævana*, *Pædisca consequana*, *Ephippiphora cirsiana*, scarce. *E. brunnichiana*, very plentiful wherever coltsfoot occurred. *Semasia wæberiana* not common, but *Catoptria ulicetana* and *C. cana*, very plentiful; as also was *Symæthis oxyacanthella*.

One specimen only of *Eupæcilia maculosana* occurred. *Catoptria pupillana*, *Conchylis francillana*, and *Xanthosetia hamana*, were almost as scarce.

Chrosis alcella occurred everywhere. *Tinea ferruginella*, *T. rusticella*, *T. tapetzella*, *T. lapella*, all occurred freely. *Fumea intermediella* was exceedingly common. *Lampronia quadripunctella*, *Swammerdamia combinella*, and *Psychoides verhuellella*, occurred sparingly. *Hyponomeuta padellus*, *H. cagnagellus*, *Plutella cruciferarum*, *Bryotropha terrella*, *B. desertella*, *B. umbrosella*, and *B. domestica*, were very common. *Depressaria yeatiana*, *D. nanatella*, *D. subpropinquella*, *D. heracleana*, and *D. applana*, were all more or less plentiful. I got a good series of *D. alstræmeriana* in my house, but found them nowhere else. Of *Lita marmorea* I obtained a few at light. *L. artemisiella* was scarce, as also were *L. atriplicella*, *Ptochenusa subocellea*, *Parasia carlinella*, *Endrosis fenestrella*, *Æcogenia quadripunctata*, and *Acrolepia granitella*, *Monochroa tenebrella*, *Argestria nitidella*, *Glyphipteryx thrasonella*, *Laverna epilobiella*, *Æcophora pseudospretella*, *Glyphipteryx fischeriella*. *Argyresthia mendica* occurred rather more commonly. *Elachista argentella* occurred everywhere, and *Argyritis pictella*, local but plentiful. *Hypsilophus schmidiellus* was to be found by diligent searching. *Lita leucomelanella* occurred here and there. *Coleophora discordella*, *C. cæspititiella*, *C. salinella*, *C. albitarsella*, all very common in the larva state; *C. troglodytella*, *C. gryphipennella*, and *C. argentula*, rather less so. *C. tripoliella* very scarce, owing to food-plant being so. Of the Pterophori I took eleven. *Platyptilia gonodactyla*, *Amblyptilia acanthodactyla*, *Oxyptilus parvidactylus*, *Mimæseoptilus pterodactylus*, fairly common. *Oxyptilus teucarii* this year was scarce. A few specimens each of *Mimæseoptilus bipunctidactylus*, *M. plagiodyctylus*, *Pterophorus monodactylus*, *Aciptilia baliodactyla*, *A. pentadactyla*, and *Alucita hexadactyla*.

The Castle, Portland, November 10, 1888.

CONTRIBUTIONS TOWARDS A LIST OF THE VARIETIES OF NOCTUÆ OCCURRING IN THE BRITISH ISLANDS.

By J. W. TUTT, F.E.S.

(Continued from p. 43.)

Xylophasia, St., *rurea*, F.

Fabricius' description of the type is as follows:—"Noctua cristata, alis deflexis, griseo fuscoque variis, posticis fuscis; margine crassiori albo." "Caput fulvum, oculis atris. Palpi fusci apice albicantes. Thorax et abdomen cinerea. Alæ anticæ griseæ basi ad marginem crassiorem macula magna fusca, in qua maculæ ordinariæ. Pone hanc puncta tria parva alba marginis crassioris et aliquot fusca sparsa in disco. Margo denique et

macula ad angulum ani fuscae. Posticæ supra fuscae margine exteriori et postico albidis. Subtus pallidæ puncto arcuque fuscis" ('Entomologia Systematica,' p. 618).

This is an exceedingly variable species, and the gradation and various phases of development as shown in its variation are very interesting. The variation strikes off in two distinct directions, both resulting in the production of distinct, almost unicolorous forms. The first group has the prevailing colours yellowish-ochreous and bright red, the second group has the prevailing colour brown. The first group appears to run from the type, with whitish-grey ground colour, to the var. *ochrea*, an ochreous-yellow form, with distinct red markings, through the var. *intermedia*, with red ground colour and distinct darker red markings, to *flavo-rufa*, an unicolorous form of a yellowish-red ground colour. The second group commences with the var. *putris*, of Hübner, of a dark ochreous ground colour, with deep red-brown markings, leading up to the *combusta* of Haw., a fuscous brown form, much clouded with darker, through the *alopecurus* of Esper, a deep reddish-brown form, with black costal streaks, and only the reniform marked, culminating in var. *nigro-rubida*, a deep reddish-black form, with no markings.

The type (grey form) is, perhaps, the rarest of all the different forms occurring in Britain. I have only specimens in my cabinet from Mr. Percy Russ, of Sligo, and from Rannoch, although Mr. Tugwell has informed me that it occurs in the Isle of Man. There is no doubt that this is the most beautiful of all the *rurea* varieties, some of the grey specimens having a peculiar glaucous tinge. This form is the *hepatica* of Haworth, and possibly the *hepatica* of Linnæus, although the latter is doubtful. Mr. T. Salvage writes:—"I took two very beautiful silvery varieties of this species (*rurea*) in Rannoch ten years ago, but have never seen the like before or since" (*in litt.*, '88). We thus have the following groups:—

- I. 1. *rurea*—the greyish-white type.
2. *ochrea*—yellowish ground colour, with typical markings.
3. *intermedia*—reddish ground colour, with typical markings.
4. *flavo-rufa*—unicolorous, yellowish-red specimens.
- II. 1. *putris*, Hb.—pale brownish-grey ground colour, with a dark brown central band.
2. *combusta*, Haw.—dark fuscous brown, with reniform outlined in white.
3. *alopecurus*, Esper—dark reddish-brown, with black costal streaks, and the reniform with black circumscription.
4. *nigro-rubida*—a deep, reddish-black, unicolorous form.

Of the varieties of this species from the Hebrides, Mr. J. Jenner Weir writes, "A very fine series was taken, showing a number of intermediate varieties between the type and the

variety *combusta*. It would be impossible to describe the rich chestnut colour of some of these most beautiful specimens, and in many instances the ground colour is in strong contrast to the dark markings" (Entom. xiv. 220).

α. var. ochrea, mihi.—The ground colour of the anterior wings of a clear yellowish-ochreous, the darker markings found in the type are all present, but much paler, and of a more distinctly red colour; a white dash on the inner margin near the anal angle, another on the inner margin just under the dark dash at the base of the wing. Thorax the same colour as the darker markings on the wings. Posterior wings pale grey, with dusky nervures; the lunule and base of the pale transverse line faintly discernible. This variety would include most of the pale forms captured in Britain and probably on the Continent. I have captured it in many localities in Kent, and have received it from almost all parts of Britain, including the Orkneys, Hebrides, and the West Coast of Ireland.

β. var. intermedia, mihi.—The ground colour of a clear reddish-ochreous, the dark markings of the type being clearly developed in a darker shade than the ground colour. The stigmata rather indistinct, owing to the deeper ground colour. The pale transverse line on the posterior wings is more distinct than in the type. This is a form distinctly intermediate between var. *ochrea*, and var. *flavorufa*. It has all the distinct markings of *ochrea*, but the reddish ground colour of *flavo-rufa*. This form occurs with the type, but appears to be rare. I have seen but few specimens, and am indebted for those I have to Messrs. Rose and Harrison, of Barnsley, and Mr. Boulton, of Hull. It is recorded from Derby by Mr. Hill, in the 'Entomologist's Monthly Magazine,' vol. xxiii. p. 6. This is the var. *β* of Guenée's 'Noctuelles,' vol. v. p. 138, but it is uncertain whether it is the *La Bigarree*, of Engramelle. Guenée says of his var. *β*:—"All the markings reappear, even the ordinary lines which are obliterated in the type. The ground colour is reddish-brown, mixed with yellow-ochreous and whitish." In Humphrey and Westwood's 'British Moths,' vol. i. p. 159, we find, "Varieties occur, with the ground colour of the fore wings bright ochre-red, with the stigmata distinct."

γ. var. flavorufa, mihi.—The ground colour of a dull yellowish-red tint, and so far resembling var. *intermedia*, but the typical markings almost entirely obsolete and lost in the ground colour. Both stigmata very distinct and outlined in yellow; some short yellow dashes along the costa (the remaining parts of the obsolete line); a yellow patch at the costal base, and a few yellow scales on the outer part of the otherwise dusky nervures, are the only markings on the anterior wings of this otherwise unicolorous variety. My specimens have come from Rannoch, Barnsley, Glasgow and Ripon.

δ. var. putris, Hb.—The *putris* of Hb., fig. 241, is without doubt a var. of *rurea*. It may be described as, "Anterior wings of a pale brownish grey, base paler, with a much waved, transverse, basal line; a longitudinal pale orbicular, and a reniform outlined in pale; a distinct transverse black wavy line beyond the reniform. Between this and the basal line the colour is dark brown, a black line passing through this darker part between stigmata, from costa to inner margin. A row of dots parallel to the hind margin; extreme hind margin dotted; hind wings dark grey, base paler, dark transverse line and dark lunule." This description of Hübner's

figure satisfies precisely the description of some of the beautiful forms brought by Mr. Salvage from the Isle of Lewis in 1887. From a figure kindly lent me by Mr. Mosley, of Huddersfield, this would appear to be the var. *borealis* mentioned by Mr. Porritt in his 'List of Yorkshire Lepidoptera,' p. 73, where he says, "Mr. S. L. Mosley says the varieties *alopecurus*, Esp., and *borealis*, also occasionally occur at Huddersfield." With reference to this var. *borealis*, Mr. Mosley, in September, '88, wrote:—"I only know the variety *borealis*, by Mr. Bond having pointed out one in his cabinet with the remark, 'That is var. *borealis*!' I took one like his specimen here, of which I send you a drawing." This drawing represented without doubt Hübner's *putris*. In Humphrey and Westwood's 'British Moths,' vol. i. p. 159, there is a remark about *borealis* as follows:—"As Mr. Curtis gives the *putris* of Hübner as probably identical with his *Xylina borealis*, and as Boisduval gives *putris* as a variety of *rurea*, Mr. Curtis's insect is, probably, a variety of this species." Of this, I think there is now no doubt. I have only seen British specimens of this var. from Lewis, but Mr. Mosley's figure proves it to occur at Huddersfield.

♂. var. *combusta*, Haw.—Haworth's description of this variety is as follows:—"Alis fusco-brunneis obsolete nebulosis, figura 3 vel 5 medio notatis." "In medio anticarum alarum stigmata ordinaria obsoleta, albido marginata, anticum ovale antrorsum valde inclinante; exterius auriforme margine albo interrupto et inde representat figuram 3 vel 5. Posticæ alæ fuscæ ciliis subflavicantibus." This variety is generally considered as synonymous with *alopecurus*, Esper, by Continental authors; but Newman, in his 'British Moths,' p. 283, points out the following phrase in Haworth's description, "fusco-brunneis et stigmata ordinaria albido marginata," which he says is not applicable to var. *alopecurus*. I quite agree with this and hence have separated them. I have no dark specimen with the stigmata outlined in white, but I do not doubt but that specimens occur in some cabinets.

♀. var. *combusta* of Hübner (fig. 366) is different to the above. It has the anterior wings, with an almost typical, reddish-brown costa, with pale costal streaks and distinct stigmata, outlined in paler, but with the lower half of the wings unicolorous, dark, reddish-brown. Hübner's *combusta* seems a combined form of var. *intermedia* (costal half of wings), and var. *alopecurus* (inner marginal half of the wing). This appears to be the nearest approach to the dark forms generally obtained in Britain. Guenée refers *combusta*, Hb., to *alopecurus*, Esp., an evident error. His description, too, of *alopecurus*, Esp., 'Noctuelles,' vol. v. p. 138, is more like Hübner's *combusta* than Esper's *alopecurus*. Guenée writes, "The ground colour of the anterior wings entirely of a deep, red-brown colour, with some bright marks on the costa, and the outside of the reniform surrounded by yellow. Fringe of the four wings equally brown, with some yellow streaks on the superiors, and a reddish line in the inferiors. Females still darker."

♀. var. *alopecurus*, Esp.—From the *alopecurus*, Esper, Plate cxlvii., fig. 3, I made the following description:—"The anterior wings of a dark reddish-brown, with five strong, black, costal streaks, no orbicular, large reniform of the ground colour, with black centre and black circumscription, three white dots on costa near apex, three parallel to hind margin near apex, three tiny white dots at anal angle, nervures black. Hind wings dark grey, with blackish nervures and lunule. Very few British specimens, I believe, will answer to this description of *alopecurus*. Guenée says of

alopecurus, Esp., "the exterior outline of the reniform yellowish." This is evidently incorrect of Esper's figure. Newman says, "uniform red-brown, the reniform spot being indicated by a pale line, and a few other darker and paler dots scattered over the wing" ('British Moths,' p. 283). Dr. Staudinger, in his 'Catalogue' says of this variety, "al. ant. unicolor, brunneis."

♂. var. *nigro-rubida*, mihi.—The most extreme melanic form of the species, of a most intensely blackish-red or blackish-brown colour; no pale streaks on the costa, and perfectly unicolorous, with the exception of a faint trace of the outline of the orbicular and the outer edge of the reniform. Hind wings dark grey, nervures more dusky. Thorax of the same dark colour as the anterior wings. The type of this variety was captured in Lewis in 1887. I have only seen specimens of this variety from the Hebrides.

(To be continued.)

NEW SPECIES OF DELTOIDS AND PYRALES FROM COREA, NORTH CHINA, AND JAPAN.

By J. H. LEECH, B.A., F.L.S., &c.

(PLATES II., III., & IV.)

THE identification of species of these obscure groups is a matter of difficulty. The existing descriptions and figures are not always easy to make out, and it is almost a necessity to compare the specimens with the original types, which latter are often in a very inferior condition. In one season's collecting I took over four hundred species of the above groups, which I have carefully compared with the types in Dr. Staudinger's, Mr. Moore's, and the national collections.

HYPENA COREALIS, n. sp., Plate II., fig. 1.

Cinnamon-brown. Primaries with a slender basal patch of darker brown, reniform represented by a square grey blotch, and the orbicular by a black dot; a broad angulated dark band, bordered internally by a blackish line and externally by a greyish white line, traverses the disc of the wing, a faint wavy submarginal line preceded by a greyish patch on the costa, a dark apical streak. Secondaries traversed by a dark basal and a pale central line; three black dots on inner margin towards anal angle. Under surface fuscous-grey, with the markings of the upper side reproduced. Expanse, 29 mm.

One of each sex taken by myself at Gensan in July, 1886.

HYPENA SATSUMALIS, n. sp., Plate II., fig. 13.

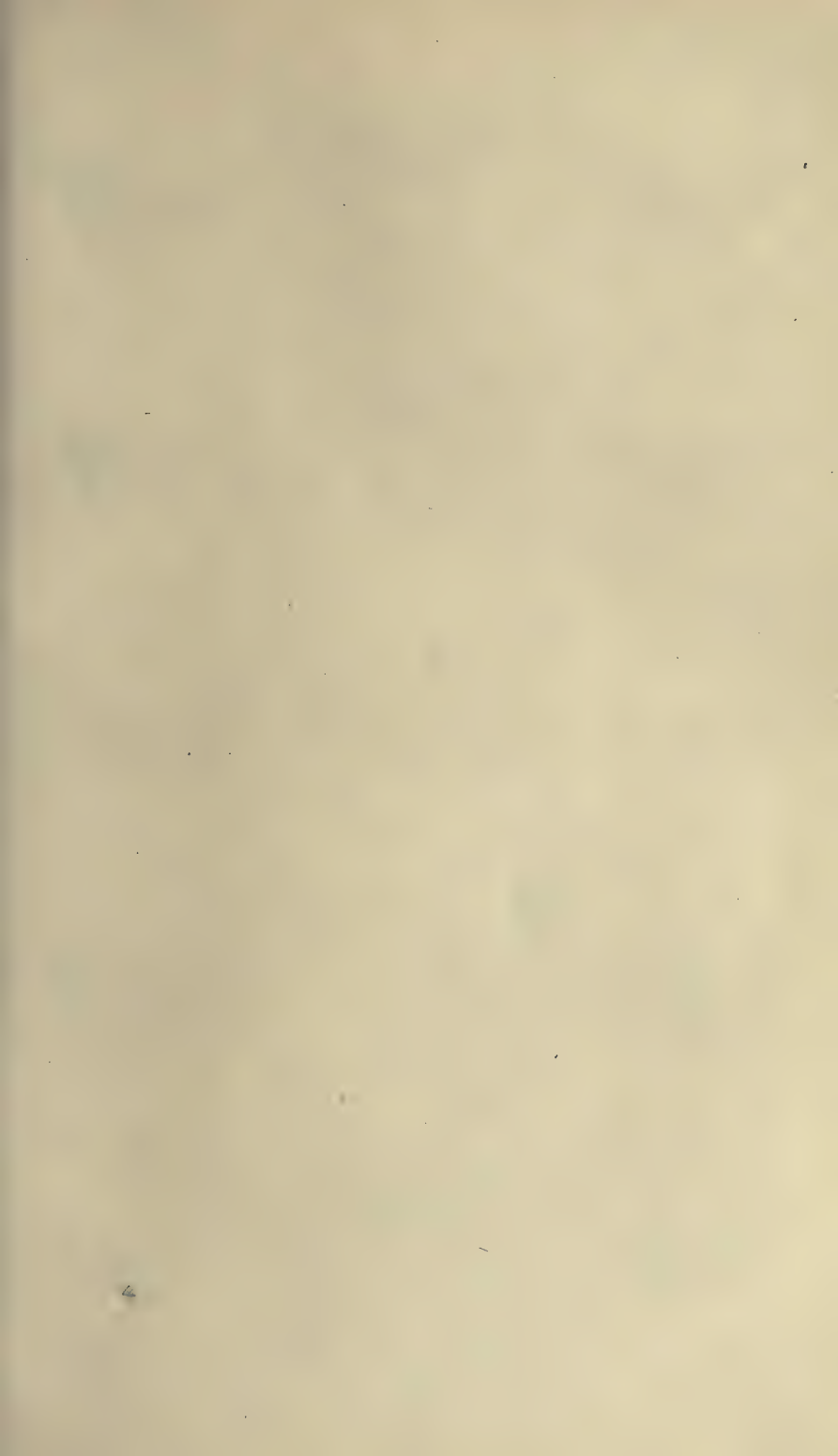
Primaries dark brown, sprinkled with grey on the basal and outer marginal areas, a narrow oblique white line beyond the middle of the wing, and a submarginal wavy whitish line commencing as a broad streak at apex. Secondaries fuscous-brown. Under surface fuscous; secondaries and apex of primaries sprinkled with darker scales. Expanse, 23—27 mm.

Nearest allied to *Hypena indicatalis*, but the transverse line of



F.W. Frithhawk del. et lith.

West, Newman & Co. imp.





F.W. Frohawk del. et lith.

West, Newman & Co. imp.

New species of Deltoids & Pyrales.

primaries is not angulated as in that species, and it has no white discal spot.

Five examples taken by myself in Satsuma, May, 1886.

HYPENA RUSTICALIS, n. sp., Plate II., fig. 12.

♂. Primaries brown, thickly sprinkled with fuscous scales, and tinged with pink; slightly oblique central and submarginal lines blackish; fringes brown interlined with blackish. Secondaries dark fuscous-brown. Under surface of primaries fuscous-brown; secondaries paler, discal spot black, dark central line on each wing. Expanse, 28 mm.

• One male example taken by myself at Hakodate in August.

HYPOEPA BAMBUSALIS, n. sp., Plate II., fig. 2.

♂. Primaries purplish brown, with a discal and marginal golden brown suffusion; a transverse bidentate white line divides the wing into equal parts, the basal half being darker; before the outer margin is a transverse dark shade. Secondaries fuscous. Under surface fuscous, primaries with some greyish scales towards apex, and an indistinct dark central line; discal area of secondaries greyish. Expanse, 32 mm.

One male example taken by myself at Foochau in April, 1886.

CAPNODES GENSANALIS, n. sp., Plate II., fig. 9.

Violet-grey. Primaries with a small brown spot at base of costa, followed by a broad brown band edged externally by a narrow white line, two indistinct parallel wavy lines cross the disc of the wing, and beyond these is a white elbowed line edged internally with blackish and externally with brown; reniform faintly outlined, except on its external edge, which is bordered with blackish, and precedes a brownish patch, orbicular black and dot-like; marginal area suffused with brown, a series of black spots on the margin itself. Secondaries with a black discal spot, white central line and black marginal spots as on primaries. Under surface yellowish grey; primaries suffused on disc and outer margin with reddish; central line, discal and marginal spots on all the wings black. Palpi, head, and thorax reddish brown. Expanse, 38 mm.

A single specimen taken by myself at Gensan, Corea, in July.

ZANCLOGNATHA LINEALIS, n. sp., Plate II., fig. 4.

Primaries pinkish buff, with a minute discal spot, and a straight narrow brown submarginal band faintly bordered externally with whitish. Secondaries pale brown. Under surface pale fuscous-brown, secondaries rather paler. Expanse, 35 mm.

One male example in Satsuma, and a female specimen at Nagasaki, taken by myself in May, 1886.

ZANCLOGNATHA OBLIQUALIS, n. sp., Plate II., fig. 5.

♂. Greyish brown tinged with violet; basal line nearly straight, central line angulated just below costa both blackish, in the enclosed area is a brownish fascia terminating before the costa; a brown submarginal band, edged externally with white, runs from apex in an oblique direction to the inner margin. Secondaries with an indistinct blackish central line; submarginal band sharply angulated before reaching the inner margin, and attenuated towards costa. Under surface fuscous-brown, discal areas of all

the wings rather paler, primaries traversed by one and secondaries by two blackish lines. Expanse, 22 mm.

One male example taken by myself at Foochau in April.

HERMINIA FASCIALIS, n. sp., Plate II., fig. 3.

♂. Pale brown, with a faint pinkish tinge. Primaries with an indistinct dark basal band; all the wings traversed by a narrow white submarginal band, broadly bordered internally with olivaceous-brown, which colour is continued to apex of primaries. Under surface greyish brown, with whitish submarginal lines and faint discal spots. Expanse, 28 mm.

One male taken by my native collector at Hakodate, July, 1887.

HERMINIA NINGPOALIS, n. sp., Plate II., fig. 7.

Fuscous-brown. Primaries with the small orbicular and large reniform stigmata yellow, outlined with dark brown; transverse basal and discal lines wavy dark brown, pale submarginal line edged internally with dark brown. Secondaries with two parallel dark brown lines traversing the disc of the wing. Under surface rather darker than above, a small discal spot, a narrow dark discal band, and a pale submarginal line. Expanse, 33 mm.

Five examples taken by my native collector in the Snowy Valley, near Ningpo, in July, 1886.

HARMATELIA BIFIDALIS, n. sp., Plate II., fig. 11.

Basal two-thirds chocolate-brown, outer third brownish buff, clouded along hind margin and towards apex with darker brown; the dividing line is blackish edged with whitish, and sharply toothed below its middle, a dark transverse wavy line towards base, and a discal series of black dots forming an indistinct Σ . Secondaries fuscous, paler towards costa. Under surface fuscous, secondaries with a darker central line. Expanse, 23 mm.

An example of each sex taken by myself at Hakodate in August.

CALOBOCHYLA BILINEALIS, n. sp., Plate II., fig. 14.

♂. Primaries greyish brown, with a few dark apical spots, and traversed by two reddish brown lines, the basal internally and the discal externally bordered with orange; between these lines are two small reddish brown spots. Secondaries pale brown, broadly bordered on outer margin with fuscous. Under surface of all the wings yellowish brown, primaries with discal spots, broad band along outer margin, and fringes blackish. Palpi, head, and collar reddish orange. Expanse, 36 mm.

One male example taken by my native collector in the Snowy Valley, July, 1886.

PLATYJA NUBIFERALIS, n. sp., Plate II., fig. 8.

Golden brown, with a purplish discal suffusion. Primaries traversed by three dark serrated lines, each commencing in a brown quadrate spot on costa. Secondaries paler towards costa, traversed by two dark central lines; submarginal line darker brown, with an external purplish edging. Under surface yellow clouded with fuscous, except at costa and apex. Expanse, ♂ 45 mm., ♀ 47 mm.

I took an example of each sex in Satsuma, May, 1886, and a female specimen at Nagasaki in June of the same year.

MESTLETA ALBICOSTALIS, n. sp., Plate II., fig. 10.

Violet-grey. Primaries with a broad whitish stripe clouded with greyish occupying the whole of the basal and a large portion of the costal areas, but not extending to the apex; the apical third is chocolate-brown clouded with darker, a faint basal line, whitish elbowed and bidentate submarginal line; fringes dark grey, narrowly chequered with whitish, and with one brown patch about the middle. Secondaries with whitish basal patch, brown linear discal spot, angulated and indented blackish central line, a large blackish spot with some blackish scales on each side at anal angle, and a marginal series of small black spots; fringes grey. Head brownish grey, thorax white, as also is the abdomen, except dorsal portions of segments 8, 9 and 10. Under surface of primaries fuscous-grey, the outer margin paler, with a series of black dots; secondaries whitish-grey, fuscous towards costa and outer margin, with central line and marginal spots as above. Expanse, ♂ 22 mm., ♀ 25 mm.

Four specimens taken by my native collector at Ningpo in June and July, 1886, and one ♀ example by myself at Foochau in April.

MESTLETA LUTEFASCIALIS, n. sp., Plate II., fig. 15.

Greyish brown. Primaries with a blackish discal line, marginal line and faint discal spot. Secondaries suffused with reddish brown about the disc, and with a pale yellow central band formed of irregularly placed confluent spots; discal spot and marginal line black. Under surface: primaries dirty grey, with faint transverse band; secondaries paler, with dark central band and discal spot. Expanse, ♂ 19 mm.

A male example taken by myself in Satsuma in May, 1886.

MERANDA TRISTALIS, n. sp., Plate II., fig. 6.

Greyish brown. Primaries traversed by a central line starting from the costa, elbowed towards the apex, and then descending to inner margin; a pale yellow apical mark and a few white streaks on the costa. Under surface fuscous-brown, discal area of secondaries rather paler. Expanse, 19 mm.

One male specimen taken by myself in Satsuma, May, 1886.

COPTOBASIS SEGNALIS, n. sp., Plate IV., fig. 4.

Brownish black, with a pale yellow discal spot and wavy central band on each wing. Under surface as above, but markings not so distinct. Pectus, abdomen beneath, and legs whitish. Expanse, 22 mm.

I took this species at Nagasaki in June, and Gensan in July. I have also received it from Ningpo and Yokohama (Manley).

HELIOTHELA NIGRALBATA (Warren MS.), n. sp., Plate IV., fig. 7.

Fore wings brown-black; hind wings velvety black: the former with a whitish spot on the costa before the apex; the latter with a bright white spot in the centre: both these spots show through on the under side. Head, thorax, abdomen, under side of wings, and fringes, brown-black. Expanse, 13 mm. Hab. Chekiang; one specimen.

An example in Mr. H. Pryer's collection without locality, but probably from Yokohama.

ENDOTRICHA BICOLORALIS, n. sp., Plate IV., fig. 17.

♀. Primaries reddish buff, costa spotted with darker; outer third purplish, the pale yellowish line of division is nearly straight, and projects

slightly into the darker portion about the middle, black discal spot. Secondaries purplish, irrorated with black, and the disc traversed by two parallel pale lines. Fringes of all the wings grey-brown, preceded by a black marginal line. Under surface as above. Expanse, 15 mm.

I took a female example at Gensan in July, 1886.

MICROSCA EXUSTA var. *ERECTA*, Plate IV., fig. 3.

♀. Yellowish ochreous, reticulated with purplish brown. Primaries have a purplish brown stripe from the apex along the costa nearly to the middle, from whence it traverses the wing directly to the inner margin; from the costal portion of this stripe a line of the same colour is projected to the outer margin. Secondaries with curved central, and indented submarginal purplish brown lines. Expanse, 22 mm.

A female example taken by myself at Gensan, July, 1886.

The narrower straight-edged central fascia would appear to afford a good character by which this insect might be specifically separated from *C. exusta* and *ardens*, but I have long series of each of these last, and am of opinion that they themselves are nothing but forms of one species. I am therefore not inclined to claim specific rank for the solitary specimen I have from Gensan, which, although it exhibits some points of difference when compared with typical examples of *C. exusta*, Butl., taken at the same time and place, is yet connected with that species by other forms taken in Japan, which are not exactly identical with typical *C. exusta* or var. *ardens*.

MICROSCA MARGINEPUNCTALIS, n. sp., Plate IV., fig. 10.

Primaries fuscous-grey, discal area tinged with pink, costa spotted with brown, three black spots below the tip, and some pale cuneiform spots on outer margin; several dusky lines from inner margin to the median nerve, discal spot black. Secondaries pinkish grey, with some small whitish discal spots separated from each other by blackish scales, two interrupted transverse abbreviated whitish bands from abdominal margin. Under surface pale brown, faintly tinged with pink; primaries thickly spotted with black along costal area, some short blackish linear marks on the disc, and some silvery white cuneiform streaks at apex and outer margin; secondaries with the discal area densely sprinkled with black scales, and divided into three portions by transverse bands of the ground colour. Expanse, ♂ 22—23 mm., ♀ 31—33 mm.

I took four specimens (one male, three females) in Satsuma, May, 1886.

MICROSCA SUBROSEALIS, n. sp., Plate IV., fig. 14.

Primaries ochreous, strongly suffused with pink, and traversed by several faint narrow brownish wavy lines, one of which beyond the blackish discal spot is sharply elbowed; costa rather paler, spotted with linear patches of brown. Secondaries pinkish red tinged with ochreous, and sprinkled with numerous faint dots arranged in transverse lines. Fringes pale brown, chequered with dark brown. Under surface pale ochreous, tinged with pink and dotted and lined with brown. Expanse, 20 mm.

An example of each sex taken by my native collector at Ningpo, in June, 1886.

DIASEMIA DISTINCTALIS, n. sp., Plate IV., fig. 5.

♂. Blackish brown. Primaries with a wedge-shaped white mark about the centre of the wing, beyond which is a white spot near the costa, a white basal line, and deeply indented central line, with a white interrupted submarginal band. Secondaries with a broad white central band bordered with black, which again is outlined by a whitish line; submarginal line white, interrupted; fringes chequered. Under surface as above, but paler. Expanse, 19 mm.

This species was taken by my native collector in the Snowy Valley, near Ningpo, in July, 1886.

BOTYS LUGUBRALIS, n. sp., Plate III., fig. 6.

Brown, with a slight cupreous tint. Primaries with a dark basal line; stigmata darkly outlined, beyond them is a sharply serrated dark line, which curves abruptly towards the centre of wing, then descends to the inner margin. Secondaries with a dark central line and discal spot. Under surface the same as upper; disc of primaries darker. Expanse, 27 mm.

This species is allied to *Botys tristialis*, Brem., but is smaller, and the central line of secondaries is not angulated. I took this insect in August, 1886, at Hakodate, Nemoro, and at Shikotan, Kurile Islands.

BOTYS MACULALIS, n. sp., Plate III., fig. 11.

Primaries blackish, with a pearly gloss; there are six pale yellow markings on the disc, the two nearest the base are oblong, placed one over the other, and separated by the median nerve, the lower is followed by a smaller triangular-shaped mark, one beyond and nearer the costa is a large irregular shaped patch, and two small spots placed colon-like under the costal nerve. Secondaries pale yellowish, traversed by central, sub-marginal, and marginal blackish bands; a projection from the internal edge of the submarginal extends almost to the central band, and the opposing edges of the marginal and submarginal bands are in contact at the anal angle, and again about the middle. Under surface: primaries paler than above, the three spots nearest the base confluent. Secondaries pale yellowish grey, with an indented and angulated transverse brown line. Expanse, 34 mm.

Of this distinct species I took one not very good male example at Tsuruga in July.

BOTYS GLADIALIS, n. sp., Plate III., figs. 5 ♂, 15 ♀.

♂. Greyish brown. Primaries tinged with ochreous, a small blackish discal spot, and a dark curved and indented central line. Secondaries paler towards abdominal margin, a dark curved central line terminates just above anal angle; fringes of all the wings fuscous. Under surface pale shining brown, tinged with fuscous, but without markings of any kind. Palpi, head, and thorax colour of primaries, body darker brown above, whitish beneath. Expanse, 27 mm.

♀. Ochreous brown, with a small blackish discal spot, and indications of a dark curved and indented central line on the primaries, there are also indications of a central line on secondaries; fringes of all the wings fuscous-brown. Under surface pale ochreous-brown, without markings of any kind. Expanse, 26 mm.

One example of each sex taken by myself at Foochau in April, 1886.

BOTYS FUSCOMARGINALIS, n. sp., Plate III., fig. 4.

Pale straw colour, clouded with fuscous-brown, especially on the outer margins of all the wings. Primaries: basal line, which is curved and slightly angulated near the costa brown, as also are two discal spots, and the elbowed and sharply angulated central line. Secondaries with two brown lines, the basal slightly curved and interrupted, the central twice angulated, and terminating before the inner margin. Under surface similar to above but lines less distinct. Expanse, 29 mm.

One example taken by myself at Hakone in August, 1886.

BOTYS MANDARINALIS, n. sp., Plate III., fig. 14.

Golden yellow. Primaries broadly bordered on the costa and outer margin with brownish purple, stigmata represented by a dark dot, followed by a <-shaped mark, a dark basal band, a short wavy line running from the middle of inner margin to the centre of wing, and a short line descending from the costa, near the apex. Secondaries paler about the disc, with a short dark central band, and broad brownish purple outer marginal band, which latter does not reach the anal angle. Under surface paler, legs and pectus white, palpi brown, fringes golden yellow. Expanse, ♂ 29 mm., ♀ 28 mm.

I took this species at Nagahama and Tsuruga in July, 1886, and also received it from my native collector. Ningpo, July.

BOTYS INORNATILIS, n. sp., Plate III., fig. 13.

Pale straw colour, with a slight tinge of grey, very silky, entirely without markings, fringes silky white. Under surface more dusky, especially about the disc of primaries, and with a faint central band. Expanse, ♂ 30 mm., ♀ 31 mm.

I took a male in Satsuma in May, and a female at Sakata in August.

BOTYS CURVALIS, n. sp., Plate III., fig. 3.

♂. Pale ochreous brown; primaries with a slightly oblique basal line, a discal spot, and a submarginal line, the latter starting from the costa runs first in the direction of the outer margin, then curving inwards descends below the centre of the wing, where it again changes its course, and falls vertically, terminating on the middle of the inner margin. Secondaries with an undulated dark central line. Fringes rather darker. Under surface: primaries fuscous-grey, secondaries paler; discal spot and lines as above. Expanse, 30 mm.

Allied to *B. damoalis*, but can be separated at once from that species by the different character of the submarginal line of primaries, and central line of secondaries.

One male taken by native collector at Ningpo in June.

BOTYS NINGPOALIS, n. sp., Plate III., fig. 1.

♂. Primaries fuscous-brown; a pale yellow quadrate spot about the middle of wing towards costa, followed by a large irregular-shaped blotch of the same colour, beyond which are two colon-like dots; central portion of costa orange. Secondaries fuscous-brown, rather paler along inner margin. Under surface a paler reproduction of upper. Anterior tibiae yellow. Expanse, 32 mm.

A single male example taken in the Snowy Valley, near

Ningpo, by my native collector in July, 1886. Dr. Staudinger possesses an unnamed specimen of this species from Amurland.

BOTYS LACRYMALIS, n. sp., Plate III., fig. 12.

Primaries brown with violet reflections; dark angulated and slightly oblique discal and elbowed central lines, the latter bordered externally by an indistinct pale band; discal spot black. Secondaries pale shining brown, with a darker curved central line, outer margin broadly bordered with violaceous brown. Fringes grey-brown. Under surface pale shining brown, discal spot black, costal area and outer margin of primaries broadly violaceous brown, a narrow streak of the same colour along the costal portion of the outer margin of secondaries. Expanse, ♂ 28 mm., ♀ 32 mm.

I took specimens in Satsuma in May, and at Nagasaki in June.

BOTYS PACALIS, n. sp., Plate IV., fig. 15.

♀. Primaries dark reddish brown, with a black basal line and discal spot; a pale dentate submarginal line internally bordered with black, terminates before reaching the inner angle. Secondaries fuscous-brown, with an indistinct central band; under surface fuscous-brown, with darker central line, discal spots paler outlined with blackish. Expanse, 23 mm.

I took one female example in the Snowy Valley, near Ningpo, in April, 1886.

BOTYS GENIALIS, n. sp., Plate III., fig. 10.

♂. Primaries dull orange, with a darker discal spot and curved central band; fringes dusky. Under surface the same as upper but duller; legs, pectus, and palpi, white.

♀. The same as male, but secondaries suffused with fuscous and under surface decidedly darker. Expanse, ♂ 22 mm., ♀ 21 mm.

I took this species at Nagasaki and in Satsuma in May and June, and also received it from Ningpo (Nat. Coll., June).

BOTYODES AUREALIS, n. sp., Plate III., fig. 7.

Golden yellow without any trace of markings; secondaries subhyaline. Legs and pectus white. Expanse 32 mm.

I took a specimen of each sex at Nagasaki in May, 1886.

BOTYODES PRINCIPALIS, n. sp., Plate III., fig. 9.

Crocus-yellow. Primaries with two series of blackish spots, indicating interrupted basal and central lines, stigmata blackish; two brown confluent patches, one situated at inner angle, and the other about the centre of outer margin. Secondaries with a black interrupted central band, and discal spot; a wavy brown submarginal band, and a brown patch at outer angle. Under-surface paler yellow, the only markings being the brown marginal patches. Legs white, except the anterior femora. An intensely black silky tuft at base of abdomen. Expanse, 43 mm.

A single specimen taken in Satsuma by myself, May, 1886, and several examples collected for me at Ichang, Central China, by Mr. Pratt, in August, 1888.

GLYPHODES BIPUNCTALIS, n. sp., Plate III., fig. 2.

Primaries brown, with a slight purple reflection; on the disc of the wing are two round white spots, bordered by a darker shade of the ground colour, the smaller of the two being nearest the base of wing. Secondaries light brown, subhyaline, with a dark central line; outer marginal area of the wing darker than the rest. Under surface a paler reproduction of upper. Legs whitish, except anterior femora, which are brown. Expanse, ♂ 30 mm., ♀ 24 mm.

I took a fine series of this species in May, 1886, at Nagasaki and in Satsuma. I have also received it from Gensan, Corea.

CATAPROSOPUS PAUPERALIS, n. sp., Plate IV., fig. 11.

♂. Light brown, sprinkled with darker scales, and having a purplish reflection. Primaries darker brown along the basal portion of the costa, wing traversed by curved basal and wavy central lines; fringes chocolate brown. Under surface; colour much the same as above, with a dark discal spot and faint reddish central line; head and palpi chocolate brown. Expanse, 26 mm.

This species was sent me by Mr. Manley, who took it in the neighbourhood of Yokohama.

SAMIA FUMIDALIS, n. sp., Plate IV., fig. 8.

♂. Primaries yellow, much clouded about the costa and outer margin with fuscous-brown; basal and deeply elbowed central lines blackish. Secondaries yellow, clouded with fuscous-brown towards the outer margin, and with a blackish, deeply elbowed central line. Under surface pale whitish-brown, clouded about the disc of primaries with fuscous-brown, discal spots and central line darker. Expanse, 21 mm.

I took this species at Nagasaki in May, 1886.

POLYTHLIPTA LIQUIDALIS, n. sp., Plate III., fig. 8.

Hyaline with pearly reflections. Primaries with the base blackish, a broad streak of pale chestnut along the inner margin, turns upwards abruptly, and terminates in a black curve before the inner angle, a wedge-shaped band bordered with black runs from costa and joins the inner marginal streak before the base; occupying the apical area is a large patch of dark brown clouded with blackish, and enclosing a white subcostal spot; stigma pale chestnut. Secondaries with a blackish discal spot, and row of four spots along the outer margin, the 1st and 4th being much the largest; at outer angle is a pale brownish blotch, internally bordered with black, and preceded by a blackish streak. Abdomen pale chestnut, legs white. Expanse, 44 mm.

I took one ♂ example of this remarkable species at Gensan, Corea, July, 1886.

CATACLYSTA PRODIGALIS, n. sp., Plate IV., fig. 16.

♂. Primaries chocolate brown, a large white patch on the inner margin, a white basal line followed by a white central line curving abruptly to the centre of the wing, then sharply to the inner margin, submarginal band white, margin orange bordered by narrow black lines. Secondaries white with broad blackish brown basal and submarginal bands traversed by yellow lines, margins orange bordered by narrow black lines; under surface similar but paler. Female rather darker than male. Expanse, ♂ 11 mm., ♀ 12 mm.

I took a nice series of this species at Gensan in July, also a specimen at Tsuruga in the same month.

HYDROCAMPA INTERRUPTALIS, Pryer, v. *separatalis*, Plate IV.,
figs. 2 & 13.

α. Colour and markings similar to the type, but on the secondaries the black lines, which in the type form the external border of the white discal spots, and traverse the wing from costa to abdominal margin, are in this form absent in the area between the spots. Under surface darker, markings as above (fig. 2).

β. Markings as in var. *α*, but the ground colour is chocolate brown. Expanse, 19—21 mm. (fig. 13).

I took a specimen at Ningpo in April, and several, including both sexes and the brown form at Gensan, in June, 1886.

LEPARODES FLORALIS, n. sp., Plate IV., fig. 1.

♂. Whity-brown; angulated basal, central, and submarginal lines of primaries whitish edged with brownish; a white line parallel with outer margin broken up into spots, each of which is edged externally with black. Secondaries pinkish towards outer margin, with two central, transverse, brownish edged, white lines, and a marginal series of white spots, edged externally with black. Under surface, fuscous-brown markings similar to upper side but less distinct. Expanse, 17 mm.

I took a ♂ example at Tsuruga, and one at Fushiki in July.

DESMIA SODALIS, n. sp., Plate IV., fig. 6.

Fuliginous black. Primaries with a quadrate white spot on disc, followed by a wavy whitish yellow submarginal line, commencing at the costa in a wedge-shaped mark, a yellow spot on the outer margin close to inner angle. Secondaries with a white central band, which widens out into a blotch about the centre of the wing. Under surface the same; pectus yellowish, antennæ tipped with yellow, body with three white bars at base, and a broader yellow bar near the extremity. Expanse, 20 mm. The sexes do not differ.

I took this species in Satsuma, May; Nagasaki, June; and received it from Mr Manley, Yokohama; and Ningpo (Native Coll.). There is an unnamed example of this species in the National Collection from Chekiang.

ZEBRONIA ORNATALIS, n. sp., Plate IV., fig. 12.

♂. White; primaries with three black spots, one of which is on the costa near the base; another on the disc, with one just below it near the inner margin; a black central line commencing as a spot on the costa, submarginal and marginal lines also black. Under surface white sprinkled with darker towards costa, markings as above but very indistinct. Expanse, 17 mm.

Three examples taken by my native collector at Ningpo in June, and one specimen by myself at Foochau in April.

ORYBA REGALIS, n. sp., Plate IV., fig. 9.

♂. Flame red. Primaries more crimson about the costal and basal areas; a large lemon-yellow spot bordered with black, and with an indentation on its outer margin, is situated just beyond centre of costa, from the extremity of this spot a red line descends to inner margin. Secondaries with a slight trace of a red central band. Under surface more dusky than upper surface. Expanse, 31 lines.

I took a single male at Gensan, Corea, in July, 1886.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

LATE APPEARANCE OF *GONOPTERYX RHAMNI*.—Referring to the late appearance of insects last year the following note may be of interest:—"On Sunday, October 28th, on the common near here, a male specimen of the above insect was taken in good condition having apparently only recently emerged. The day was bright and warm.—A. DRUITT; Chapel Street, Berkhamsted. [This species has been noted flying on warm days in the South of England at a later period than that above given.—ED.]

ANTHOCHARIS CARDAMINES AND VANESSA URTICÆ (VARS.).—I have received from Thame (Oxfordshire) a female *A. cardamines*, with an orange splash on the left fore wing. A similar marking also occurs on the right upper wing, but only on the under side. The *V. urticæ* was bred with a large number of others. It is similar to the fourth figure in Newman's. The specimens were taken and bred respectively by a lady, who was struck by their abnormal appearance.—ALFRED T. MITCHELL; 5, Clayton Terrace, Gunnersbury, W., January 12, 1889.

VARIETIES OF *COLIAS EDUSA*.—In reply to Mr. T. D. A. Cockerell's note (Entom. 13) with reference to my notice of the capture of a "primrose coloured" *Colias edusa*, var. *helice* (Entom. xxi, 272), I would say that by this description I did not at all mean to suggest that the specimen is as yellow as our own *Colias hyale*, or the North American *Colias philodice*; but I think I may safely describe it as being in tint mid-way between these species, and the European *Colias phicomone*. It is often exceedingly difficult to give an accurate name to shades of colour, perhaps the definition of this as "light straw" would be preferable. Besides there are primroses and primroses, and when I wrote I had not in my eye the "yellow primrose" of the poet "by the river's brim," newly expanded, but one full-blown and somewhat bleached by exposure to sun and weather. In the season of 1877, when *Colias edusa* was so extraordinarily abundant in this country, it was my fortune to set more than fifty of the variety *helice*, of Haworth, taken here. For the sake of convenience in speaking of them to my friends, I roughly divided them into "white," or "primrose coloured;" but in fact they present a variety of tints, from the typical greenish white, through light straw, to dark cream colour. I have, moreover, a so-called "intermediate" variety of the female, between *edusa* and *helice*, of a peculiar buff, with the marginal spots whiter than in the usual form. There is a male specimen of *edusa* in my drawer, which always attracts attention from the glowing rosy violet of the hind wings—quite as shining as *Apatura iris*, but altogether of a different colour, this being very rosy. A male *edusa*, with a tinge of this lovely tint in the hind wings, was taken by Mr. F. Purchase here in September last. It is, however, not nearly so beautiful as my own.—JOSEPH ANDERSON, jun., Chichester.

VANESSA C-ALBUM IN FEBRUARY. — On February 3rd this year I caught a damaged specimen of this rare insect on the borders of some woods near the Tichborne estate. While on wing it appeared to be nothing more than a mutilated *V. urticæ*, and my only reason for attempting its capture was on account of curiosity at such Icarian behaviour. Although the morning was bright enough, the weather was not such that we might

expect hibernated lepidopterous insects to be tempted from their winter retreat.—A. J. FIELD ; 43, Medina Road, Finsbury Park, N.

VANESSA URTICÆ IN FEBRUARY.—On Feb. 18th and Feb. 19th I saw a *Vanessa urticæ* on the wing at this unusual time for butterflies.—R. J. CARTHEW ; Woodbridge Abbey, Suffolk.

ABERRATION OF PYRAMEIS CARDUI.—I have received from Mr. A. Sidney Olliff, of Sidney, New South Wales, a copy of a paper he read before the Linnean Society of New South Wales, "On two instances of Colour variation in Butterflies." In this communication he draws attention to a remarkable aberration of *Pyrameis cardui*, which had been taken at Bombala, New South Wales, by Mr. G. Masters. Mr. Olliff gives to this specimen the varietal name of *P. suffusa*, and states that it "bears a remarkable resemblance in the markings of the upper side to a variety bred by Mr. J. A. Clark, from a larva found on the banks of the river Lea, near London, which was figured in the 'Entomologist' for April, 1880. I have myself an aberration of *P. cardui*, taken at Graham's Town, South Africa, exactly like that figured in the 'Entomologist,' which I exhibited at the meeting of the South London Entomological and Natural History Society, on October 7th, 1886 (Vide 'Abstract of Proceedings for the Year 1886,' p. 60). It would therefore appear that this extraordinary aberration of *P. cardui*, of that *bizarre* character which I should have deemed not likely to have occurred more than once, has now been found in Europe, Africa, and Australia.—J. JENNER WEIR; Beckenham, February 4, 1889.

THECLA W-ALBUM IN OXFORDSHIRE.—Relating to Mr. Clarke's notice of the capture of *Thecla w-album* in Oxfordshire (Entom. 47), I may notice that this species was taken in the neighbourhood of Banbury on August 7th, 1882, when I netted a worn specimen in the road leading from Bloxham to Bloxham Grove. I mentioned this to Mr. Beesley of Banbury, who said he remembered another being caught in the same neighbourhood.—J. F. PERRY ; Oscott Cottage, Birmingham, February 9, 1889.

DEILEPHILA GALII IN SCOTLAND.—Amongst the numerous reports of the occurrence of *P. galii* last season, I have not observed any from this district. A specimen was taken inside one of the buildings connected with the Glasgow Exhibition, having doubtless flown in at the open door attracted by the electric light. It is now in the possession of Mr. E. C. Eggleton, of the Kelvingrove Museum.—T. J. HENDERSON ; 24, Florence Place, Glasgow.

SPHINX LIGUSTRI ON LAURESTINUS.—I paid a short visit to Great Malvern late in October. Very few insects were observed upon the wing, but among them were several specimens of *Vanessa c-album*, which appeared quite fresh. The larvæ of *Sphinx ligustri* had been very plentiful upon laurestinus, a shrub upon which I have never taken it before. At this late date they were still found commonly, and one specimen did not pupate till the first week of November. The larvæ of *Odontopera bidentata* were found in abundance chiefly upon the same food-plant.—ALFRED T. MITCHELL ; 5, Clayton Terrace, Gunnersbury, W., January 12, 1889.

ZYGÆNA LONICERÆ, VAR.—Amongst several very interesting varieties of *Z. loniceræ* which I bred last season, I obtained one with the top and

bottom wings of the left hand side alike, the bottom wing of the right hand side being of the usual red with a black border.—W. HEWETT, 3, Milton Terrace, Fulford Road, York, January, 1889.

LITHOSIA COMPLANA.—As regards the situation in which *Lithosia complana* is taken, Mr. Tutt's experience (Entom. 14) differs much from my own. The whole of my own series of some dozen specimens and a few others which have been distributed among various entomologists, were taken on heaths near King's Lynn. Further: I find that this species has been recorded in several other localities in Norfolk, and these localities are mostly situated *quite* inland, one or two of them nearly in Mid-Norfolk. Indeed, *L. complana* seems to be widely distributed in this county, seeing that it occurs not only on the coast (which by the way is the exception), but also in the fens, on the breck-sands, and heaths. The latter is not only the kind of situation in which this insect occurs most freely in Norfolk, but it is, I believe, in such a situation it is most generally taken in this country. On heaths the larva would most probably feed in part, if not entirely, upon the lichens which here, and I suspect not unfrequently elsewhere, cover the stony and drier ground. I may add that we take *L. complana* and the commoner *L. complanula* together, but with us the last-named species is far more abundant in woods and lanes.—E. A. ATMORE; 3, Haylett Terrace, Exton's Road, King's Lynn, Norfolk, Jan. 15, 1889.

DASYCAMPA RUBIGINEA IN WALES.—At a meeting of the Penarth Entomological Society, held on December 11th, among other specimens exhibited was a *Dasycampa rubiginea*, in good condition, captured at sugar by Mr. T. L. Howe.—G. A. BIRKENHEAD; Hon. Sec. of Penarth Entomological Society, Penarth, January 3, 1889.

THE BRITISH PLUSIA NI.—The recent records of *Plusia ni* in the south of England, and also of an American moth, *Hadena albifusa*, at the Isle of Portland, suggest an enquiry as to what is exactly meant by our *Plusia ni*. *P. ni*, a south European species, is represented in America by a form called *P. brassica*, Riley, which is abundant and injurious to cabbages in the United States. Now as it is not unusual in *Plusia*, we have in *brassica* a species so near to *ni* as to be very frequently confounded with it, and constant enough in its characters to be regarded as distinct. For this reason, a specimen now believed to be *brassica*, found in England years ago, was recorded as *ni*, and is still supposed to be such by many British entomologists. The question therefore naturally arises, are these recent captures really *ni*, Hb., or *brassica*, Riley? If they are *brassica*, the natural inference is that they are somehow imported from America, in the same way as *H. albifusa* must certainly have been. I need not go any further into this matter, but hope that a re-examination will be made of the English examples of "*ni*," to see what they really are.—T. D. A. COCKERELL; January 24, 1889.

PLUSIA CHRYSITIS.—Whilst collecting in a favourite lane about two miles from here in 1887, the moth *Plusia chrysitis* appeared in great abundance among nettles which grew along a hedge side for about fifty yards. I first noticed them on the 7th of July, when I took five, and on the 8th I took two more, and on the 9th, which was the best night, they were a sight which I shall never forget. They could be taken in numbers up to seven with one

stroke of the net. On the 11th they were very plentiful, and on the 12th there were very many, but by the 18th they were all gone. The moths appeared twice each evening, soon after sunset, and again about 10 o'clock, p.m. Mr. Newman speaks of this moth in his work on 'British Moths,' as having two broods, one in June, and another in August. I have looked in vain for it in both months here, but have never seen or taken them excepting in July; the earliest capture being on the 7th of that month. I have never taken them after the 27th of July. *Plusia pulchrina*, *P. iota*, *Habrostola triplasia*, *Odonestes potatoria*, *Noctua festiva*, were also very plentiful in the same place in 1887; while this year I have worked the locality much more frequently than last, but have only succeeded in taking six *P. chrysis*, the first of them being taken on the 18th July, and five *P. iota*, two being very small. I only got one each of *N. festiva*, *H. triplasia*, and *P. pulchrina*, but no *O. potatoria*. I send this note thinking it might be of some interest respecting the remarks of Mr. W. White, on the effect of meteorological conditions upon insect life (Entom. xxi. 217).—W. T. RAINS; 333, Ladypool Road, Sparkbrook, Birmingham.

OXYPTILUS TEUCRII.—In his note on this species (*ante* p. 34), Mr. South seems to have overlooked the fact that *heterodactyla* was De Villers' name, not Haworth's. Careful as Haworth always was, we cannot surely accept a solitary specimen so labelled by him as sufficient proof of our *teucii* being De Villers' *heterodactyla* of 1789, to justify the rejection of its present well-known name.—C. A. BRIGGS; 55, Lincoln's Inn Fields, February 5, 1889.

ABUNDANCE OF SOME LEPIDOPTERA.—Notwithstanding the backwardness of the season of 1888, several species, although a little late, were of extremely common occurrence in the New Forest. *Macroglossa fuciformis* appeared throughout June last in utter profusion in a favourite locality, which I visited at least three times during the first and second week of the month with Mr. McRae, of Bournemouth. I believe others can give similar experience concerning the abundance of this species. *Catocala promissa* and *C. sponsa*, which emerged early in August, were also exceedingly plentiful again in a great many parts of the Forest, though *C. promissa* was much the commoner of the two, and the specimens exceptionally large, which was the reverse in 1887. I had very little difficulty in taking in one evening alone sixty picked specimens, leaving many others on the trees, sometimes noticing six to eight on a patch of sugar. On June 20th Mr. Druitt and I had a day together in the Forest, and found the little black *Gnophria rubricollis* in good condition and in very fair numbers, at rest on bracken ferns, sometimes in the very thick of the wood. One fact noticeable was their curious manner of jerking themselves upon the ground and feigning death when we were approaching them. Should one happen to be unacquainted with this peculiarity, the insects might thus easily escape detection.—J. M. ADYE; Somerford Grange, Christchurch.

LEPIDOPTERA IN GUERNSEY AND SARK.—I think Mr. W. H. Blaber's description of Sark as "a bleak and barren island" (Entom. xxi. 324) is likely to mislead, and may prevent some collectors from visiting it. All who have hitherto written about Sark consider it remarkably fertile and the following extract from 'Inglis' Channel Islands' is an exact description:—"Although Sark is usually called a table land, it is intersected by deep,

wooded, romantic valleys, watered by little tumbling brooks. I descended into all these valleys, dells, and hollows, and found some of them surpassingly beautiful,—singularly contrasting, in my recollection, with the barren and rocky coast, that so little prepares one for scenes of soft and wooded fertility. In some spots it is indeed difficult to believe that one is on a small islet, two or three leagues in circumference. One valley, the valley of Dixcart, is every way a charming spot; it is a winding valley about a quarter of a mile broad, flanked by hills that appear lofty, owing to its great depth. Wood in infinite variety fills the lower part of the valley, while the green sides of the hills, dotted with cattle, entirely shut out the view of the sea." As far as my experience goes, butterflies are more numerous in Sark than in Guernsey. I have taken twenty-six species there, viz.:—*Pieris brassicæ*, *P. rapæ*, *P. napi*, *Colias hyalæ*, *C. edusa*, *Gonopteryx rhamni*, *Argynnis latona*, *A. aglaia*, *Melitæa cinæia*, *Vanessa polychloros*, *V. urticæ*, *V. io*, *V. atalanta*, *V. cardui*, *Pararge egeria*, *P. megera*, *Satyrus semele*, *Epinephele ianira*, *E. tithonus*, *Cænonympha pamphilus*, *Thecla rubi*, *Polyommatus phlæas*, *Lycæna astrarche*, *L. icarus*, *L. argiolus*, *L. ægon*. Of these, *A. aglaia* and *C. pamphilus* have never been taken in Guernsey, and *A. latona*, *V. io*, *C. hyalæ* and *G. rhamni* are much commoner in Sark than Guernsey. Amongst the less common moths the following have been taken in Sark:—*Acherontia atropos*, *Sphinx convolvuli*, *Gnophria rubricollis*, *Callimorpha hera*, *Bombyx trifolii*, *Saturnia carpini*, *Bryophila glandifera*, *Agrotis lunigera*, *Dianthæcia nana*, *Trigonophora flammea*, *Heliothis armigera*, and *Catocala nupta*. *C. hera* is very abundant in some seasons, and on one occasion I took as many as eighteen in one afternoon, many being of the yellow variety, *lutescens*. Is Mr. Blaber quite sure that the butterflies he noticed in Guernsey were *Argynnis paphia*? I have collected and observed our Guernsey butterflies for the last twenty years, and have never met with a single specimen.—W. A. LUFF; 12, Mansell Street, Guernsey, December, 1888.

EXTRACTION OF MOTHS FROM PUPE.—As a boy I always used to help my insects to emerge (Entom. 50 *et ante*), on the same principle that I pulled up cuttings to see if they were striking. The victims were generally *Arctia caia*, *Bombyx quercus*, and *Odonestis potatoaria*. The latter sometimes developed, the two former never. The wonder was that any did, as they were extracted from the cocoons about a week after spinning up, and then gently pinched every morning like peaches, till eventually some happy morning the thoracic plates cracked. Sometimes they were peeled at once; sometimes a fragment was taken off at intervals during the day. I was led to repeat the boyish experiment in wiser years in the case of *Papilio machaon*, one of which died when fully developed, without making an effort to emerge. This led me to crack the next one, when the markings showed fully through the wing-cases, and to take the insect out. It did not seem happy; and I discovered that the wings, besides the outer case, were also enclosed in a very delicate sheath. The upper side of this had been left in the case, but under the wings some fragments were left adhering which seemed to prevent growth. These I removed and then the insect developed. But one or two subsequent operations have failed.—G. M. A. HEWETT; The College, Winchester.

SIREX GIGAS IN YORKSHIRE.—This insect was last July and August fairly common near York, several fine specimens coming into my possession.

—W. HEWETT. [I have seen occasional specimens of *Sirex gigas* among the fir woods at Sandburn, near York, where it doubtless breeds regularly.—JOHN T. CARRINGTON.]

PRIONUS CORIARIUS IN EPPING FOREST.—While taking a ramble in Epping Forest last October, I found a dead specimen of that rare beetle, *Prionus coriarius*, near Dulsmead Hollow. I have never heard of it being taken so near London but perhaps it may not be so rare near this great metropolis as we suppose.—A. J. FIELD; 43, Medina Road, Finsbury Park.

CALLICERA ÆNEA.—One of the rarest and most beautiful of the larger Syrphidæ, were taken last summer in three very widely scattered localities, but only in single specimens. The first was taken by the Rev. T. A. Marshall, at Cornworthy, near Totnes, July 26th; the second, by Mr. Albert Piffard, near Great Berkhamsted, Hertfordshire, August 6th; the third, by me at Guestling, near Hastings, August 22nd. All three specimens were taken on the flowers of Umbelliferæ. I believe this scarce Dipteron has but once before been recorded as occurring in Britain; its threefold occurrence last summer is therefore of considerable interest.—E. N. BLOOMFIELD; Guestling, Sussex, February, 1889.

PRESERVING PUPÆ OF INSECTS.—Could any one please tell me the way to preserve pupæ of insects? I wish to preserve some. I unsuccessfully tried plunging.—HUGH JACKSON; 7, North Brink, Wisbech, Cambridgeshire.

URTICATION BY HAIRS OF INSECTS. — If some of your readers who have been “stung” by the larvæ or cocoon hairs of Lepidopterous larvæ, would kindly answer the following questions either by postcard or letter, I should be much obliged, as I am endeavouring to obtain a little light on the subject of urtication:—1. By what insects “stung?” (a) By the larvæ. (b) By the cocoon hairs. 2. The part of the body affected? (a) The palm of the hand. (b) Any other part. 3. The character and appearance of the part, if any? 4. If perspiring when “stung?” 5. If the skin be thin and sensitive to the attacks of insects? 6. Any other remarks?—R. FREER; St. Mary's Hospital, Paddington, W., February 7, 1889.

HIGH FLAT-SETTING. — Might I point out one more advantage in setting insects a tolerable height on the pin, *viz.*, the prevention of grease infecting the paper or other specimens? When insects are set in the usual English fashion, their bodies, or at least part of them, generally touch the paper. If the insect greases it affects the paper, and even the cork, and spreads rapidly throughout that portion of the drawer. Now with insects set higher on the pin this is an utter impossibility, as no part of the insect touches the drawer, or another insect, if one is careful not to let it do so. The insect affected can thus grease as much as possible, without the fear of it spoiling anything save itself. One need not go to extremes with regard to the height of the insect on the pin; surely there is some medium between our low English setting and the very high Continental method. Those who object to the high setting appear to think it must mean an insect stuck on the top of a long Vienna pin, whereas one two-thirds high on our ordinary English pin, is all that is required for all practical purposes, and serves all the advantages we hold for high flat-setting.—A. E. HALL; Norbury, Sheffield, December, 1888.

TURF PLATES FOR CABINET DRAWERS.—I am arranging my collection in a new cabinet of seventy drawers, which I have lined with the German turf plates instead of cork. Perhaps it would be interesting to entomologists to know the result of my experience of this comparatively new substitute for cork. I did the lining myself. First, I reduced the plates to about half-an-inch thick. I found the best way to do this was to put the plates in a wooden tray just large enough to hold them, which I had made for the purpose, with a rim half-an-inch high all round. Any part of the plate which stood above the rim could thus be pared off with a sharp knife, and then smoothed down with a piece of No. 1½ glass paper. Next I trimmed each edge with a thin knife, the edges are liable to crumble if the knife is too thick. I found an old dinner knife the best. Then I cut the plates to fit the drawer, and used glue not too thin, as the turf soaks it up rapidly. I applied the glue to the bottom of the drawers, not to each plate, as the less one wets the plate the better. When glued in they must be weighted down until dry. When dry I rubbed over the plates again lightly with fine glass-paper, fastened to a flat piece of wood. Any holes, or cracks, can be filled up with some of the fine dust of the turf, mixed to a paste with strong parchment size. Next I gave them a coating of strong size whitening, and before it got cold, rubbed it over well with a piece of flat smooth wood, or better still, stone, so as to get the whitening well into the pores of the turf. When this is dry, smooth it down with No. 1 glass-paper. The drawer is then ready for papering, and has a smoother surface than ever obtained with cork. When it comes to putting in the insects, I have found no hard places, such as there are in cork, so the pins go in easily anywhere. Turf being thicker than cork and quite soft all through, one can push down as far as one can wish any insect set high on the pin, and bring it on a level with one that has the pin only just through it. This I find a very great advantage, as in exchanging one gets so many different styles of setting, some high on the pins some low. I was afraid at first that turf was not elastic enough to hold a pin firmly, but I find that the coating of whitening, together with the paper, makes just as good a hold for the pin as cork. On the whole, I consider turf plates a great improvement on cork; and should always recommend them for cabinets.—WILLIAM FARREN; 14, King's Parade, Cambridge. [We should like to have the opinion of those who have used turf for some time, especially in connection with ordinary brass pins.—J. T. C.]

General Index to the 'Entomologist.'

A desire has been expressed for a General Index to the Volumes of the 'Entomologist' for the last Twenty-five years, and including Vol. I. (1840-2). Such an index, framed according to the rules of the Index Society, based on the examination, by an Entomologist, of every page, and not merely a compilation from the existing indexes, would be of great value to workers, as saving much time. It would, however, be of value to the few rather than to the many, and so would not be likely to command a large sale. It is for those who desire such an index to give practical evidence of their desire by expressing willingness to subscribe for copies, and to this end attention is called to the accompanying circular.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*February 6th, 1889.*—The Rt. Hon. Lord Walsingham, M.A., F.R.S., President, in the chair. The President announced that he had nominated Capt. H. J. Elwes, Mr. F. Du Cane Godman, F.R.S., and Dr. D. Sharp, Vice-Presidents for the session 1889-90. The Rev. F. D. Morrice, M.A., of Rugby: Mr. A. Robinson, B.A., of Brettanby Manor, near Darlington; and Mr. H. Burns, of Fulham, S.W., were elected Fellows; and Mr. B. A. Bower, and Mr. H. S. Fremlin, were admitted into the Society. Lord Walsingham exhibited a larva of *Lophostethus dumolini*, Guer., sent to him by Mr. Gilbert Carter, from Bathurst, West Coast of Africa. Mr. G. T. Porritt exhibited several melanic specimens of *Boarmia repandata* from Huddersfield, and, for comparison, two specimens from the Hebrides. Mr. M'Lachlan remarked that melanism appeared to be more prevalent in Yorkshire and the north midlands than in the more northern latitudes of the United Kingdom. Capt. Elwes read a paper "On the genus *Erebia*, and its geographical distribution." The author, after referring to the number of species and named varieties, many of which appeared to be inconstant as local forms, made some remarks on the nomenclature of the genus, and suggested that a better system of classification might be arrived at by anatomical investigation. It was stated that little was known of the early stages and life-history of species of this genus, the geographical distribution of which was Alpine rather than Arctic. The author remarked that it was curious that there was no species peculiar to the Caucasus, and that no species occurred in the Himalayas, where the genus is replaced by *Callerebia*; that none were found in the Himalo-Chinese Subregion, and none in the Eastern United States of America. He also called attention to the similarity of the species in Colorado and North-West America to the European species. Lord Walsingham, Mr. Waterhouse, Mr. O. Janson, Mr. M'Lachlan, Dr. Sharp, and Mr. Jenner Weir took part in the discussion which ensued. Mr. W. Warren read a paper "On the *Pyralidina* collected in 1874 and 1875 by Dr. J. W. H. Trail in the Basin of the Amazons." Mr. C. J. Gahan read a paper entitled "Descriptions of new or little-known species of *Glenea* in the Collection of the British Museum." Dr. J. S. Baly communicated a paper entitled "Notes on *Aulacophora* and allied genera."—H. Goss, *Hon. Secretary*.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY. — *January 24th, 1889.* T. R. Billups, President, in the Chair. Rev. Joseph Greene, M.A., was elected a member. Mr. W. H. Tugwell exhibited a fine bred series of *Deilephila galii*. Mr. J. A. Clark, *Acidalia immorata*. Mr. Adye, forms of *Argynnis paphia*, var. *valezina*. Mr. Tutt, on behalf of the Rev. C. A. Sladen, a black and almost spotless variety of *Strenia clathrata*, a melanic specimen of *Agrotis simulans*, Hufn., taken in the Hebrides. The Annual Meeting was then held. The Treasurer then read an abstract of his accounts for 1888, showing a substantial balance in favour of the Society. The Council's Report was read by the Secretary, and the following gentlemen were elected as officers for 1889. Mr. T. R. Billups, President. Mr. J. T. Carrington, and Mr. W. H. Tugwell, Vice-Presidents. Mr. E. Step, Treasurer. Mr. W. West (Greenwich), Curator. Mr. D. J. Rice, Librarian. Mr. H. W. Barker, Secretary. Mr. H. J. Turner, Assistant Secretary. Messrs. R. Adkin, C. A. Briggs, T. W. Hall, J. Henderson, W. Manger, J. R. Wellman, and J. J. Jenner Weir, Council.

February 14th.—The President in the chair. Mr. A. C. Vine was elected a member. Mr. Adkin exhibited examples of *Arctia caia* from Morayshire and Kent, and *Hydræcia nictitans*, from Morayshire. Mr. Tugwell, a marked variety of *Chærocampa porcellus*, the usual deep rose colour of the wings being replaced by a pale olive-green, shaded with grey markings; also a variety of *Deilephila galii*, bred from larva taken at Deal, the usual characteristic markings of dark olive-green, being replaced by dull grey, the pale streak that runs from the inner margin to the tip of the wing being obscured and dull in colour; inferior wings of a dull pale grey, lacking the rich rose shade at the anal angle. He remarked that he had bred two of this variety, and up to the present time seventy of the type. Mr. Turner, light forms of *Zygæna filipendulæ*, from Reigate. Mr. C. A. Briggs, *Triphæna comes* and *T. pronuba*, from various localities. Mr. Weir exhibited three male and three female specimens of a butterfly he had received from the Falkland Islands. They were of the same genus as our well known *Brenthis* (*Argynnis*) *selene* and *B. euphrosyne*, and were apparently closely allied to the Chilian *B. anna*, Blanch. Mr. Weir stated that he had not yet been able to make the necessary references, but he was at present disposed to regard them as a species new to science; and if upon future examination he found his view correct, he proposed for them the name of *Brenthis falklandica*. He thought the specimens were sexes of the same species although the shape of the upper wings differed materially, and the difference in the colouration of the underside of the under wings was considerable; but on the other hand he could detect no difference in the distribution of the colour on the upper side of either of the upper or lower wings. It was interesting that palæarctic and nearctic genera of Lepidoptera reappeared at the southern part of S. America, which were quite unknown over a vast extent of the intermediate latitudes. But it should be borne in mind, that there was in the American continents an almost continuous chain of mountains from the Arctic Ocean to the Straits of Magellan, which might have formed a connected temperate region by which the migration of species from the north to the south was effected at a time when the temperature of the earth was different to that which now obtains. Mr. Tugwell, two very dark specimens of *Boarmia repandata*, received from Mr. Porritt. Mr. Weir read a letter from Dr. Percy Rendall, who is now resident at Bathurst, Gambia. Observations were made upon a reported case of stridulation by a species of *Vanessa*, and a discussion ensued.—H. W. BARKER, *Hon. Sec.*

REFERENCE ENTOMOLOGICAL SOCIETY.—The report of the Committee of the South London Entomological and Natural History Society read recently at the Annual Meeting, contained allusion to the scheme for a Reference Society, as discussed last year (*Entom.* xxi. 10, 68, 121). It will be remembered that it was found impracticable with a small subscription to institute an independent Society upon the lines indicated; so the South London Society stepped in and enlarged their facilities for country membership. The result has been eminently successful, and many entomologists, representing students of various orders, have not only joined, but availed themselves of the use of the library and naming of specimens sent up for the purpose. It seems desirable that these facilities should be widely known, for they cannot fail to be most useful to entomologists residing in isolated localities.—[J. T. C.].

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LIST OF THE BRITISH STRATIOMYIDÆ, WITH ANALYTICAL TABLES AND NOTES.

By E. BRUNETTI.

SINCE the publication of Walker's work on British Diptera in the 'Insecta Britannica,' many important changes have been made in the classification and nomenclature of this order, and his work requires a large number of corrections and additions. A new work on the whole of the British Diptera is much to be desired, and Mr. Verrall's recently published list, which comes almost as a revelation, will form a splendid basis for operations.

A comparison between Walker's list of Stratiomyidæ and the species recognised in this paper as truly British, will show at a glance in what an unsatisfactory state are most of the hitherto published works on our indigenous species of this order.

BRITISH STRATIOMYIDÆ.

- | | | |
|---------------------------------|----------------------------------|----------------------------------|
| PACHYGASTER, Mg., 1804. | <i>nigripes</i> , Verr., 1887 | <i>infuscatus</i> , Mg., 1822 |
| <i>ater</i> , Panz., 1798 | <i>pulchella</i> , Mg., 1822 | <i>flavipes</i> , Mg., 1822 |
| <i>leachii</i> , Curt., 1824 | <i>morrisii</i> , Curt., 1824 | |
| <i>tarsalis</i> , Zett., 1842 | | CHRYSONOTUS, Loew., 1855. |
| | STRATIOMYIA, Geof., 1784 | <i>bipunctatus</i> , Scop., 1763 |
| EPHIPPIUM, Lat., 1809. | <i>longicornis</i> , Scop., 1763 | |
| <i>thoracicum</i> , Lat., 1809 | <i>riparia</i> , Mg., 1822 | CHLOROMYIA, Dunc., 1837. |
| | <i>furcata</i> , F., 1792 | <i>formosa</i> , Scop., 1763 |
| NEMOTELUS, Geof., 1796. | <i>chamæleon</i> , DeG., 1752 | |
| <i>uliginosus</i> , L., 1767 | <i>potamida</i> , Mg., 1822 | MICROCHRYSA, Loew., 1855. |
| <i>pantherinus</i> , L., 1761 | | <i>polita</i> , L., 1761 |
| <i>nigrinus</i> , Fall., 1814 | ODONTOMYIA, Mg., 1804. | <i>flavicornis</i> , Mg., 1822 |
| <i>notatus</i> , Staeg., 1842 | <i>microleon</i> , L., 1761 | |
| | <i>argentata</i> , F., 1794 | BERIS, Lat., 1802. |
| OXYCERA, Mg., 1803. | <i>ornata</i> , Mg., 1804 | <i>clavipes</i> , L., 1767 |
| <i>trilineata</i> , F., 1781 | <i>tigrina</i> , F., 1781 | <i>vallata</i> , Forst., 1771 |
| <i>analis</i> , Mg., 1822 | <i>angulata</i> , Panz., 1798 | <i>chalybeata</i> , Forst., 1771 |
| <i>longicornis</i> , Dale, 1842 | <i>hydropota</i> , Mg., 1822 | <i>fuscipes</i> , Mg., 1820 |
| <i>terminata</i> , Mg., 1822 | <i>viridula</i> , F., 1775 | <i>morrisii</i> , Dale, 1842 |
| <i>pardalina</i> , Mg., 1822 | | |
| <i>formosa</i> , Mg., 1822 | SARGUS, F., 1798. | ACTINA, Mg., 1820. |
| <i>pygmæa</i> , Fall., 1817 | <i>cuprarius</i> , L., 1761 | <i>tibialis</i> , Mg., 1820 |

TABLE OF GENERA.

A.	Abdomen of only 5 or 6 segments, Scutellum unspined, or with only 2 spines.	
B.	Discoidal cell, emitting 3 veins.	<i>Pachygaster.</i>
BB.	Discoidal cell, or this and the posterior basal cell, together emitting 4 veins.	
C.	Scutellum spined,	
D.	Thorax with a strong spine on each side.	<i>Ephippium.</i>
DD.	Thorax unspined.	
E.	First antennal joint 3 or 4 times as long as the 2nd.	<i>Stratiomyia.</i>
EE.	First antennal joint at most twice the length of 2nd.	
F.	Antennal style, short.	<i>Odontomyia.</i>
FF.	Antennal style, long.	<i>Oxycera.</i>
CC.	Scutellum unspined.	
G.	Last antennal joint blunt, about $\frac{1}{3}$ length of antenna.	<i>Nemotelus.</i>
GG.	Last antennal joint forming a thin style, at least as long as the antenna.	
H.	Style seated before the apex.	
I.	Ocelli equidistant.	<i>Chrysonotus.</i>
II.	Front ocellus removed somewhat from the others.	<i>Sargus.</i>
HH.	Style seated at the apex.	
J.	Eyes pubescent.	<i>Chloromyia.</i>
JJ.	Eyes bare.	<i>Microchrysa.</i>
AA.	Abdomen of at least 7 segments. Scutellum 2, 4, or 6 spined.	
K.	Discoidal cell emitting 3 veins	<i>Beris.</i>
KK.	Discoidal cell emitting 4 veins.	<i>Actina.</i>

1. PACHYGASTER, Mg. (1804), Sys. Bcs. iii. 146.

= VAPPO, Latr.; NEMOTELUS, Panz.; SARGUS, Fall.

(Germar, in 1817, gave the name PACHYGASTER to a genus of Curculionidæ).

Basal half of wing blackish. - - - - - *ater.*

Wing entirely clear. - - - - -

Legs pale yellow - - - - - *teachii.*Legs black; anterior tibiæ and all tarsi yellow - *tarsalis.*

M. Perris, a French Entomologist, considers the larva of *Pachygaster* closely allied to that of *Sargus*.

1. *P. ater*, Panz. (1798), F. Germ. liv. 5. = *pachygaster*, Fall. — Macquart gives some interesting notes on the larva in his 'Dipteres du Nord de France,' and Schilling figures it in Ent. Beit i. pl. viii. 8. Rather common.

2. *P. leachii*, Curt. (1824). Br. Ent. 42 = *pallidipennis*, Meq. — Walker mistakes femora for tibiæ in speaking of the brown spot on the hind pair. Not common.

3. *P. tarsalis*, Zett. (1842), Dip. Scan. i. 152. — Very rare. Mr. Verrall found one in the late Mr. Wilson Saunders' collection, and introduced it to the British fauna in the Ent. Mo. Mag., 1886, p. 179.

2. EPHIPPIUM, Lat. (1809), Gen. Crust. Ins. vi. 276.

= STRATIOMYS, Pz.; CLITELLARIA, Walk.

1. *E. thoracicum*, Lat. (1809), l. c. 276. = *ephippium*, Walk.; larva (figures), Westw. Class. Ins. ii. fig. 127, 128. — Very rare. It has been taken in Coombe and Darenth Woods. In the British

Museum and Mr. Dale's collection. Von Heydon has taken the larva in a nest of *Formica fuliginosa*.

3. NEMOTELUS, Geof. (1796), Hist. d'Ins. ii. 542.

= STRATIOMYS, F.; MUSCA, L.

A. Abdomen in male basal half white, apical half black; in female all black, with a dorsal row of yellowish white spots.

1. ♂. Basal half of abdomen unspotted, belly white, humeral spots blackish.

♀. Sides of thorax unstriped. - - - - - *pantherinus*.

2. ♂. Basal half of abdomen unspotted, belly black, humeral spots whitish.

♀. Sides of thorax with a white stripe, no white spot above the antennæ. - - - - - *uliginosus*.

3. ♂. Basal half of abdomen with a central black spot.

♀. Sides of thorax striped, a white spot above the antennæ. *notatus*.

AA. Abdomen in male and female all black. - - - - - *nigrinus*.

1. *N. uliginosus*, L. (1767), Sys. Nat. ii. 983. = *muticus*, F.; *bifasciatus*, Mg.—I have a specimen from the late Mr. Walker's collection, in which the abdomen is brown instead of yellowish white. Common. Very variable.

2. *N. pantherinus*, L. (1761), F. Suec. (1783). = *marginatus*, F.; *uliginosus*, Pz.; *marginellus*, Fall.; *muticus*, Schr.—This species is said never to be taken in company with *N. uliginosus*. Common. Very variable.

3. *N. nigrinus*, Fall. (1814), Strat. 6; Curt. 729. = *nigritus*, Pz.—Curtis says this species has a greenish cupreous tinge, which I have not noticed, but perhaps this is the case during life. Not common.

4. *N. notatus*, Staeg. (1842), in Zett. Dip. Scan. i., 148. = *ventralis*, Mg.—Introduced as British by Mr. Verrall, in the Ent. Mo. Mag. for Jan., 1886. Rather rare.

Walker and Curtis both say *N. brevirostris*, Mg., has been taken near London, the former adding, "in the Entomological Club;" but as I can trace no specimen, and it is a very rare species on the Continent it seems advisable to exclude it until further capture takes place. Nearly all the species of *Nemotelus* are very variable, and it is difficult to determine them with certainty unless a series of specimens is available for examination.

4. OXYCERA, Mg. (1803), Illiger's Mag. ii. 265.

= SARGUS, ODONTOMYIA, Lat.; STRATIOMYS, F.; MUSCA, L.

A. Abdomen green (or greenish yellow in one var.), with black markings never extending to the edge. - - - - - *trilineata*.

AA. Abdomen black, with yellow spots or bands always extending to the edge.

B. Wings with dark brown suffusion below the stigma. - - - *analis*.

BB. Wings without suffusion.

C. Abdominal spots only at the extreme edge and tip often united, or abdomen all black.

D. Abdomen all black.

- E. Antennæ long; legs black; in female yellow with black tarsi tips. *longicornis*.
 EE. Antennæ moderate; legs tawny yellow; in female with black ring on posterior femora - - - - - *terminata*.
 DD. Abdomen with yellow side spots.
 F. A broad yellow band round the sides of the thorax, interrupted at base of wing. Apical abdominal spot usually united to the others.
 G. Antennæ tawny. - - - - - *pardalina*.
 GG. Antennæ black - - - - - *formosa*.
 FF. A very thin band round the sides of the thorax. Apical abdominal spot seldom united to the others. - - - - - *pygmæa*.
 CC. Abdominal spots large and wide, extending nearly across the disc, and with one large apical spot.
 H. Thorax striped in female. - - - - - *pulchella*.
 HH. Thorax not striped in female. - - - - - *morrisii*.

1. *O. trilineata*, F. (1781), Sp. ins. ii. 418. = *hypoleon*, L.—A not uncommon variety, known as *collaris*, is yellow instead of green. Not rare. Occurring near London.

2. *O. analis*, Mg. (1822), Sys. Bes. iii. 130.—An uncommon species, easily recognised by the suffused stigma. Dorsetshire is the only locality I know of. This county seems to produce nearly all the known British species of this genus, they are certainly all much more abundant in the extreme south-western counties of England than elsewhere.

3. *O. longicornis*, Dale (1842), Ann. Nat. His. viii. (431). = ? *terminata*, Wlk.: ? *tenuicornis*, Mcq.—A rare species, recognised by the much lengthened antennæ. One var. with a very narrow abdominal border from the middle to the apex seems to be the *terminata* of Walker, whose description applies only to the female, as he says "legs tawny," whereas in the male they are all entirely black. It appears to be closely allied, if not identical with, Macquart's *tenuicornis*; in the latter event *tenuicornis* has priority. Without seeing Macquart's type it is impossible to speak with certainty. The female may be separated from the female *terminata* by having a pair of whitish yellow spots on the vertex of the head which are absent in *terminata*.

4. *O. terminata*, Mg. (1822), Sys. Bes. iii. 130.—Very rare. It was a long time before I was satisfied that this was really a British species, but I have recently seen some specimens from Mr. Dale's collection taken in Dorsetshire, which are undoubtedly of this species. Walker says there are four yellow spots behind the eyes, but this is not the case, his description evidently being of a variety of *longicornis*. Curtis gives Pinny (June and July) as a locality, taken by Mr. Morris, in company with *O. pardalina*, but without seeing the actual specimens it would be rash to conclude they were correctly named, owing to the great increase in the number of known species of this genus and their close affinities.

5. *O. pardalina*, Mg. (1822), Sys. Bes. iii. 128.—Walker says "not rare," but I have not seen any British specimen of it yet.

Mr. Verrall includes it in his list, and Mr. Dale records it from Dorsetshire. It is certainly a rare species.

6. *O. formosa*, Mg. (1822), Sys. Bes. iii. 127. = *nigricornis*, Enc. meth.; *muscaria*, Mg.—Rather uncommon. From the South Coast and Dorsetshire.

7. *O. pygmæa*, Fall. (1817), Strat. ii. = *affinis*, Curt.; *muscaria*, Wlk.—In one male and one female in Dr. Mason's collection the whole underside of the abdomen is black, with two or three yellow bands extending across it. Schiner says the scutellum is black, but I find the posterior border more or less yellow, in one specimen in the British Museum it is entirely yellow. Curtis gives this as a synonym of *muscaria*, Fab., but both are distinct; the latter, moreover, does not appear to be British. Not uncommon. Mr. Verrall found it abundant once at Tuddenham.

8. *O. nigripes*, Verrall.—I have not seen a specimen of this species, which is new to science, recorded by Mr. Verrall from Scotland, but it seems to fall in this division of the genus. As I do not know the characteristics of this species, it was impossible for me to insert it in my analytical table.

9. *O. pulchella*, Mg. (1822), Sys. Bes. iii. 125. = *vara*, Walk.; *hypoleon*, L.—In one specimen in Dr. Meade's collection the whole of the basal half of the abdomen is tawny. In Dr. Mason's collection I found what appears to be an interesting variety, with two triangular yellow spots on the vertex of the head, a yellow edge to the abdomen, and entirely tawny legs, with the exception of black tarsal tips. Rather common.

10. *O. morrisii*, Curt. (1824), Br. Ent. 441.—The female is easily distinguished from the last species by the thorax being unstriped. The male is still unknown. Rather rare but widely distributed, as I have a list of eight well separated localities in England and Ireland. It is much smaller than its congener *pulchella*.

It is difficult to determine exactly how many species of *Oxycera* are really British, as several have been introduced at a time when the genus was less well understood, and in consequence have to be erased from our list. Curtis introduces *O. leonina*, Pz., recording one female from Pinny, taken by Mr. Morris, but I cannot trace the specimen. This species is allied to the *longicornis* group. The abdomen is all black with a single yellow apical spot. Walker introduces *muscaria*, F., saying it is "not rare in England and Ireland," but I can find no proof of its having been taken here. He also introduces *falleni*, Staeg., and *dives*, Lw., as British, the first on the authority of Haliday from Ireland, the latter as being in the Entomological Club collection from England, but I can trace no specimens of either species, both of which are rare on the Continent. There is certainly a

large species of *Oxycera* allied to *pulchella* in the Entomological Club collection, but it is not *dives*, and as it has no history attached, it would be unsafe to infer the specimen is British.

5. STRATIOMYIA, Geof. (1784), Ins. ed. Fery.

= THYREODONTA, Rond.; ODONTOMYIA, Lat.;

HIRTEA, Scop.; MUSCA, L.

- A. Abdomen without spots or bands. Thorax with ferruginous hair *longicornis*.
 AA. Abdomen with yellow spots or bands. Thorax with grey hair.
 B. Abdomen with 3 distinct pairs of spots; no bands.
 C. Belly black.
 D. Four yellow stripes on belly. Abdominal spots yellow. - *furcata*.
 DD. Three yellow stripes on belly. Abdominal spots whitish. - *riparia*.
 CC. Belly yellow, with 3 irregular black bands. - *chamæleon*.
 BB. Abdomen with 1 pair of spots and 2 bands, the first interrupted in male. *potamida*.

The larva of *Stratiomyia* seems to frequent unusual localities, as one has been found in a hot spring in Colorado, and another in sea water. It appears also very tenacious of life, as a correspondent of the 'Entomologist,' vol. xiii., records one having lived for three months in sand without any moisture to sustain life, and on being placed in water soon recovered its ordinary activity.

1. *S. longicornis*, Scop. (1763), Ent. Carn. 999. = *strigata*, *thoracica*, F.; *villosa*, *nubeculosa*, Mg.—A somewhat variable and uncommon species. The ferruginous colour of the pubescence on the thorax is much more pronounced in the male. I have seen it from Acton, Lewes, Colchester and Hastings. In the species of this genus, except *potamida*, males are smaller than the females.

2. *S. riparia*, Mg. (1822), Sys. Bes. iii. 138. = *strigata*, Mg.—A much rarer species than the latter, and allied to both that species and *furcata*. Seaford. The female of this and the next species has bare eyes, and were it not for this, Rondani's genus, *Thyreodonta*, would stand good for those species of *Stratiomyia* with pubescent eyes.

3. *S. furcata*, F. (1792), Ent. Sys. iv. 264. = *chamæleon*, L.; *panthaleon*, Fall.; *singularis*, Harris.—Rather common, generally distributed. Closely allied to the preceding species.

4. *S. chamæleon*, De G. (1752), Ins. vi. 64. = *aquatica*, Frisch.; *sellata*, Sulzer; *nigrodentata*, Mg.; larva, Walk., Ins. Brit. Dip. i. 14.—Walker illustrates and describes *potamida* as *chamæleon*, and erroneously gives the former as a synonym. Swammerdam first described the larva. In the British Museum collection is a variety with the first two antennal joints tawny. Rather common, but less so than *furcata*. Generally distributed.

5. *S. potamida*, Mg. (1822), Sys. Bes. iii. 136. = *chamæleon*, Walk.—Commoner than the preceding. Widely distributed. All the species of this genus, except *riparia*, occur around London.

(To be concluded.)

NOTES UPON *PHYTOMYZA CHÆROPHYLLI*, KALT.

BY PETER INCHBALD, F.L.S., AND R. H. MEADE.

AT the close of December, 1888, I recently gave some account (Entom. xxii.) of the habits of this mining Dipteron, in the pupa-condition of life, giving the food-plant, and its singular tunnel in the leaflet-segments of the *Chærophyllum temulum* and other allied species. I looked for it to put on wings in the spring, but I did not expect to see it until April or even May. Several, however, have emerged from their pupa-cases in February. I have reared nearly a dozen, both males and females, and narrowly watched their development. Two broods thus occur in the year, in spring and autumn.

Kaltenbach was, I believe, the first to rear the tiny Miner, and after him our fellow-countryman Hardy, who characterised it by the generic name of *Chromatomyia*, from its peculiarly-shaped pupa-case. I sent living imagines to Dr. Meade, who has furnished me, most kindly, with an admirable diagnosis of the fly, which will be appreciated by all who study the minuter forms of Dipterous life.

PETER INCHBALD.

Grosvenor Terrace, Hornsea, Holderness, February 16, 1889.

Phytomyza (Chromatomyia, Hardy) chærophylli*, Kalt.

Nigro-cinerea obscura; ventro pallido nigro-fasciato; proboscide halteribusque albidis; pedibus cinereis, genubus prioribus flavidis; alis subcinereo-hyalinis, venis long. 4 tis pone apicem excurrentibus. Long. ♂ et ♀ 1—1½ mm. (circiter ⅔ lin). Dull grey; eyes red (in life); head, face, palpi, and antennæ, black; proboscis pale yellow; thorax, with scutellum, dark grey, without lustre, with a few long whitish hairs upon the sides; and two rows of fine dorso-central bristles rather wide apart, seated upon very minute black spots. Abdomen dull blackish grey upon the dorsum, and yellowish white beneath. The posterior edges of the segments are marked upon the back with very fine pale transverse lines, which coalesce on the sides with the white ventral surface. The latter is furnished down the centre with a series of quadrate black spots. The anal segment in the male is small, round, prominent and shining black. Halteres large and milk-white. Legs wholly black-grey, with the exception of the knees and roots of the tibiæ of the front pair, which are pale yellow; the extremities of the knees of the posterior pairs show a yellow point in some specimens. Wings hyaline, with a slightly dusky hue; the costa and three first longitudinal veins are robust and black; the fourth and fifth longitudinal are paler, but quite distinct; and the anal vein is well developed, and extends about two-thirds of the way to the margin of the wing. The transverse vein is single and very short; the third longitudinal reaches the

* Hardy separated the species of *Phytomyza* of Fallen into two genera, on account of the different forms of the pupæ, which in some are barrel-shaped, in others slipper-formed. The former he termed *Chromatomyiæ*, the latter *Phytomyzæ* (Annals of Nat. Hist., W. 385).

margin of the wing some way before the apex; and the fourth a short distance behind it.

The female closely resembles the male in every respect, only it has the abdomen furnished with a short pointed shining black oviduct.

This small species is closely allied to *Phytomyza nigra*, Mgn., and to *P. obscurella*, Fln. The description of the former is so short that its identity cannot be determined with certainty; but the knees of all the legs are described as being pale. *P. obscurella* is said to differ from *Chærophylli*, by having knees likewise pale, the abdomen shining black, and the ends of the fourth longitudinal veins of the wings close to the apex.

These little flies shrivel up and alter so much when dry, that comparisons between old preserved specimens are of little use; descriptions taken from recently killed examples must be consulted for the purpose of identification.

R. H. MEADE.

RHOPALOCERA AT WIESBADEN.

By R. M. PRIDEAUX.

WIESBADEN is situated on the right bank of the Rhine, about $2\frac{1}{2}$ miles from the river. The tract of country lying between the town and the Rhine consists entirely of cultivated ground, bare hedgeless tracts of which are studded with apple, pear, walnut-trees, &c., and divided up by cart-tracks and paths. North-west of the town, however, lie the Taunus Hills, being a wooded district intersected by broad well-watered valleys, and it is here that collecting can be most profitably pursued. The woods on the hills consist for the most part of beech and oak; occasional patches of fir and larch being planted here and there. The valleys that lie between the hills are very fertile, and watered by one or more small clear streams. There is no undergrowth allowed to grow in the woods, and there are very few hedges, the absence of which, both as "cover" for the imagines and food for their larvæ, doubtless accounts for the scarcity of some kinds of Lepidoptera, which is especially noticeable among the Geometræ. A great variety of flowers and coarse plants, especially Umbelliferæ, grow in the green valleys, which are always mown down for hay during July. The late spring of 1888, and the exceptionally wet and cold summer that followed it, render the experiences of that one season hardly representative of what one might expect to meet with under more ordinary conditions, both as to times of occurrence and numbers of specimens. In the former, especially, I found that my own observations seldom coincided with those set forth in a work—'The Lepidoptera of the District of Wiesbaden,' by Dr. Adolph Rossler, which was

published some eight or ten years ago. I shall mention the *Rhopalocera* in their usual classified order, not in the order of their occurrence, to avoid repetition in case of double-brooded insects.

Papilio machaon is double-brooded. The first brood appeared from the 18th of May, and continued throughout June, being fully a month late; the second brood throughout August. They are generally distributed about the wood-valleys and cultivated fields, but nowhere very abundant. *P. podalirius* is single-brooded, and a good deal scarcer than the last-named, and appeared about a week later. Its increasing rarity is attributed, and, no doubt rightly, to the destruction of hedges containing sloe, the food-plant of the larva. The imagines I noticed once or twice at the blossoms of the lilac in the gardens skirting the town.

Aporia cratagi was abundant in the valleys by about June 12th, and was but a short time on the wing. The larvæ were common during April and May wherever sloe grew, and I took one web of them on hawthorn. They also feed on the cultivated plum trees, so the butterflies are not confined to the woods but are common in the fields, where I noticed them pitched on the corn-stalks in dull weather.

Pieris brassicæ, *rapæ* and *napi*, were all abundant and double-brooded. The under sides of the second brood of *P. rapæ* are of a much brighter yellow tint than those of the spring brood.

Anthocharis cardamines was fairly common throughout May. I was unable to remark the difference between these and my Clifton specimens of *cardamines*, mentioned by Mr. J. J. Weir (Entom. xxi. 143), the orange patch not occupying more space on the hinder angle than in English examples.

Leucophasia sinapis was abundant but rather local, preferring the damper places in the wood-meadows. The first brood began to appear on May 13th, and the second on July 20th.

Gonopteryx rhamni was abundant about the woods, being seen from July 25th on, the hibernated ones being common in the spring.

Colias hyale is double-brooded at Wiesbaden, and last year was abundant in both broods. The first began to appear at the end of May, and continued throughout June. Insects of the second brood continued common both on the clover-fields and in the meadows and woods throughout August and September. I could detect no radical difference, either in size or markings, between the two broods, but in both, the butterflies varied very considerably in size, breadth of the black margin, and chiefly in the intensity of colour; there being every intermediate shade between a lively yellow, and white, scarcely perceptibly tinged with yellow. Of *Colias edusa* I did not see a specimen; they are said to be as capricious in their appearance as with us.

Argynnis paphia was very abundant. I noticed the first specimen on June 29th, and they remained on the wing throughout July and the first half of August. As with us they preferred the bramble blossoms on the outskirts of woods. I did not see the variety *valesina*. *A. adippe* appeared on the wing later than any of the other *Argynnidæ*, the first specimen I met with being on July 20th. It was on the wing for about a month, and was not very abundant. They flew along with *aglaia* and *niobe* in the flowery valleys lying between the woods. On July 21st I had the good

fortune to capture a fine specimen of the variety *cleodoxa*, having the usual silvery spots replaced by fulvous. *A. niobe* was, by June 20th, already very abundant in the valleys, it being the first of the larger fritillaries to appear. The variety *eris*, in which the silver spots are replaced by fulvous, was quite as common as the type; males being apparently more subject to this variation than females. Intermediate varieties between *eris* and the type, having the silver spots only partially replaced by fulvous, were rare. *Niobe* continued on the wing throughout the remainder of June and July. *A. aglaia* occurred a little later than *niobe*, and was not quite so abundant, but was found in the same situations. *A. latona* did not occur with the others of the genus in the damp, fertile valleys, but preferred dry, stony ground not near woods, and especially in stubble-fields. In such places it was fairly common during the last half of August and through September. There are said to be two broods previous to this one, but I did not observe the insect before August 12th. *A. euphrosyne* first appeared on May 16th, and was on the wing about three weeks. Very common in the damp valleys. No sign whatever of a second brood. *A. selene* was abundant, but more local than *euphrosyne*, preferring damper spots as a rule. It emerged eight or ten days later than the last insect. There was a partial second brood early in August, specimens of which were smaller than those of the spring brood. *A. dia* was the first of the genus to appear, being already abundant in the damp valleys by May 16th. They seemed somewhat local, but were nowhere scarce. The second brood, which produces specimens as abundantly as the first, began to appear on July 20th. These did not differ in the slightest in size or appearance from the spring brood.

Melitæa aurinia was abundant in the low-lying valleys from May 24th till the middle of June. Neither this species nor the rest of the *Melitæa* genus were nearly as local as they are with us, but most of them, except *M. didyma*, distributed pretty generally about the marshy meadows intersecting the woods. Of *M. cinxia* I netted a few specimens during the last week of May. It was not so abundant as the rest of the genus. It is single-brooded. *M. didyma* is double-brooded. I only met with one specimen of the first brood, and it was larger than any I subsequently took in July. Although a few specimens may occasionally be found in the wood-valleys, I found the head-quarters of this insect to be on a steep hill-side, covered with short grass, not mown for hay, and some distance from the woods. Here in occasional spots it swarmed during the last ten days of July. *M. athalia* was common from May 27th to the end of June, and could scarcely be called local. I met with a few solitary specimens in the beginning of August which seem to give evidence of a partial second brood. I took a good specimen of a variety much resembling the fourth figure of *M. athalia*, given in Newman's 'British Butterflies.' *M. aurelia* was far the most abundant of the genus, it swarming in all the meadows in woods during the last half of June and through July. I took a variety of the same sort as that of *M. athalia*, having the fulvous tint greatly predominating. *M. dictynna* was very scarce. I took two or three specimens at the end of June, flying with *M. aurelia*, which they greatly resembled in flight.

Vanessa c-album is double-brooded at Wiesbaden. The first brood appeared at the end of June, and the second about the middle of August. They were somewhat local, preferring stony ground, but nowhere scarce. Specimens of the first brood were lighter and larger than those of the second. *V. c-album* was the first, along with *V. polychloros*, to appear

after hybernation in the spring. *V. polychloros* is single-brooded, and was abundant both before and after hybernation. I took the larva from wych elm, and saw the first freshly-emerged imago on June 28th. They seemed all to have retired to their winter quarters before the beginning of August. *V. urticae* did not appear nearly so commonly as the last insect. The larvæ were fairly abundant in August. *V. io* was common at the beginning of August, and the larvæ at the end of June. Of *V. atalanta* I saw one or two specimens during the last half of September in 1887, but did not observe any up to the end of August, 1888. *V. antiopa* was seen abundantly in the spring after hybernation, and continued to fly till the middle of June. The borders of all these were, without exception, white, like the so-called British *antiopa*. I saw a few at sallow bloom, and also at the pear blossoms. The first freshly-emerged butterfly I took was on August 2nd, and they continued on the wing for about three weeks, and then disappeared, retiring presumably to their winter quarters. They were now by no means as commonly seen as in the spring. I never observed a specimen settle on a flower, they seeming to prefer puddles in the roads or putrid matter to feed on. The borders of all the fresh specimens was a rich buff colour. I noticed that the size of the blue marginal spots varied considerably on different specimens. At Wiesbaden the larvæ feed usually on sallow. Mine eat birch or willow indiscriminately in confinement. In the pupæ I met with the metallic spots usual to the genus were scarcely perceptible. *V. cardui* was common on the tracks about the cultivated ground during June, and was abundant in the same situations through August.

Limenitis sibylla was generally distributed, but not very common in the woods during July and first half of August. I netted a few specimens at bramble blossom.

Apatura iris I saw settling in the muddy puddles on roads in the woods on July 9th, also some flying high over the oak trees. Owing to the rest of the month being for the most part very cold and wet, I only once observed *iris* again, and then far out of reach. I beat a few young larvæ of this and the next species from sallow late in October, and hope to rear them successfully when the spring comes. Early in November these larvæ spin a carpet of silk on a twig of sallow, and attach themselves firmly to it, after which it is impossible to dislodge them by beating. *A. ilia* was more abundant than the last. The males of this beautiful species were to be seen sunning themselves on the muddy roads early in July.

Melanargia galatea swarmed from the end of June till the beginning of August in all the meadows.

Satyrus semele was rare. I saw one or two specimens by an unworked limestone quarry.

Pararge egeria was also scarce. I noticed a few specimens about the middle of May and two more in July. *P. megæra* I did not see anything of till the end of July, when it began to appear abundantly on all the stony tracks about the corn fields.

Erebia medusa appeared very locally on marshy spots in the wood-meadows on May 30th, and continued a short time on the wing. *E. athiops* was abundant, but also local during the first three weeks of August. It seemed to prefer drier situations than *E. medusa*. The colours and markings of the underside of *E. athiops* presented a great deal of variety.

Epinephele ianira swarmed everywhere in June, July and August.

E. tithonus was scarce. I saw a few specimens at bramble blossom early in August. *E. hyperanthes* was distributed about the woods, and was partial as usual to bramble blossom. I took a specimen of the variety *arete*, with each eye-spot barely indicated on the underside by a white speck.

Cænonympha arcanius, occurred from June 20th till the end of July, and was common on all grassy places, and in the more elevated meadows. *C. pamphilus* was abundant everywhere.

Thecla betulae I saw rarely in the perfect state, flitting on the outskirts of woods. The larvæ were abundant on sloe in May and June, from which I bred several imagines. *T. ilicis* was fairly common but local from June 25th on the blackberry blossoms, from which they were easily taken. I subsequently saw two or three at the wild thyme. *T. quercus* was scarce. I netted two or three during July. *T. rubi*, though supposed to be double-brooded here, did not put in an appearance a second time, but was very abundant in May and first half of June.

Polyommatus virgaureæ was scarce. They prefer the more highly situated meadows in the woods. I netted about eight females during the first half of August, and only two males. *P. chryseis* was also not common and decidedly local, preferring the marshy spots in the meadows, where one might meet with one or two specimens by some hours' hunting. I took more males than females of this species, possibly owing to their being so much more conspicuous. *Chryseis* is single-brooded, and occurred during the latter half of June. *P. dorilis* was the most abundant of the "Coppers," it being apparently double-brooded, and occurred most commonly during the last half of May and first half of June, and then in greater profusion in August. The great difference between the males and females of this species, both as to markings and outline of the wings is somewhat puzzling at first. The tawny patch in the centre of the forewing of the male, varies very much in extent and brilliancy. *P. phlæas* occurred at the same times as *P. dorilis*, but was not nearly so abundant.

Lycæna argiades occurred but very sparingly in May, in the small form. I netted only two, a male and female of this first brood, and saw one other. The large form, the second brood, was far more abundant, preferring any piece of open rough ground to the meadows in woods, where I did not once observe it. Some disused quarries of limestone produced it most abundantly, but one met with it occasionally all over the tracks intersecting the cultivated ground. *L. ægon* was double-brooded and abundant. Large specimens of the second brood seemed to correspond to insects I saw named as *L. argus* in European collections, but I was unable satisfactorily to distinguish the two, so am not sure whether I met with the true *L. argus* or not. *L. corydon* is not supposed to inhabit the Taunus Hills, nevertheless I met with two odd specimens in different places not on chalk; one on July 22nd, and the other on August 14th. It is said to be abundant at Mayence, eight miles from Wiesbaden. *L. baton*, Bgstr. (*hylas*), occurred in May and July, and was generally distributed in the meadows in woods. They appeared far more abundant during July than in May. *L. astrarche* was scarce. I met with one or two on some broken ground during July and August. They were like our southern specimens, but rather larger than usual. *L. icarus* was very abundant everywhere and triple-brooded; specimens of the third brood were very diminutive in size. *L. bellargus* is not supposed to occur at Wiesbaden, but is abundant on the other side of the Rhine opposite. In September of 1887, however, I took several

specimens on a piece of chalky ground that was soon after built over, so *bellargus* was exterminated. These were all I met with, with the exception of a single specimen on July 22nd, in one of the more elevated of the wood-meadows, but nowhere near chalk. *L. argiolus* was very scarce; I only saw one specimen of the May brood, and netted three or four during July of the second brood. The larva is said to live on heather; it is certain that neither holly nor ivy can be its food-plants, as the former is unknown wild, and the latter plant very rare near Wiesbaden. *L. cyllarus*, Rott., was abundant but somewhat local, from the middle of May till the second week in June. It is single-brooded. *L. arcas*, Rott., and *euphemus*, Hb., were abundant, but exceptionally local, preferring marshy low-lying meadows, where *Sanguisorba officinalis* grew. The former insect was somewhat earlier than the latter, being on the wing from about July 20th till the middle of August, while *euphemus* swarmed during the last week in July and first in August. I met with some interesting varieties of *L. arcas*, both as to the number and size of the black spots on the fore wing, which are arranged much like those on *L. arion*. In one specimen all the spots except the discoidal one are obsolete. *L. arion* was abundant, and distributed wherever wild thyme grew. They were on the wing from July 18th till about the middle of August. They varied a good deal in size, my smallest specimen being 1 in. 2 lines in extent of wing, and the largest 1 in. 8 lines. The black spots on the wing varied even more than in *L. arcas* in number and magnitude, in some they are barely indicated, and in others cover the greater part of the wing. The breadth of the black margin also varies considerably. *L. acis* was rare. I only met with four, two males and two females. I took them on a sloping dry meadow on the outskirts of a wood. They appeared in June, and are single-brooded. *L. alsus* was not common. I noticed one or two specimens of both broods (occurring in June and August) on the grassy hillside of a dry meadow.

Nemeobius lucina was scarce, and continued but a short time on the wing. I netted about half-a-dozen specimens in the middle of May. The larva must feed at Wiesbaden entirely on cowslip, *Primula veris*, as the primrose is not found wild.

Syrichthus malvæ was abundant throughout May. Of *S. alveus* I took one specimen in a chalk pit near the Rhine.

Nisoniades tages was abundant in May, and I noticed a few specimens in July of an imperfect second brood.

Spilothyrus alceæ, Esp., was common on dry grassy places during June.

Hesperia sylvanus and *comma* were both fairly common in July, in open spaces in woods. *H. thaumas* abounded everywhere in July.

This makes a total of 75 species, which number might doubtless be enlarged by harder work in a more favourable season. Butterflies got so charmingly but distractingly abundant by the beginning of June, that it became no easy matter to follow down some suspicious-looking *Lycæna* or *Argynnis* among the crowds of various insects that swarmed in the flowery valleys. I was disappointed in failing to meet with *Pieris daphnidice*, but I saw no sign of it, although I netted many white butterflies on suspicion.

CONTRIBUTIONS TOWARDS A LIST OF THE VARIETIES OF NOCTUÆ OCCURRING IN THE BRITISH ISLANDS.

By J. W. TUTT, F.E.S.

(Continued from p. 62.)

Xylophasia, St., *hepatica*, L.

The type of this species is described by Linnæus, 'Systema Naturæ,' p. 853, No. 169, as "Noctua spirilinguis cristata, alis glaucescentibus; fascia ferruginea abbreviata terminalique plicata." "Dorsum pluribus exasperatum. Alarum color hepaticus: fascia ferruginea vix latus interius appropinquante." Guenée, in his 'Noctuelles,' vol. v., p. 144, says: "Linnæus has badly described it as 'wings glaucous;' and Clerck has figured it with bluish wings, which made Hübner believe that it was *tincta*." Hübner figures *tincta* under the name *hepatica*. I am inclined to think that Guenée, who was undoubtedly not well up in the varieties of this group, did Linnæus an injustice. My own impression is, that the Linnæan type was a glaucous one, and that our forms are different to the Linnæan type. There is a constant glaucous variety of *rurea* (closely allied to the type). I have a glaucous variety of *scolopacina*. Why should there not be a glaucous form of *hepatica*? The British specimens appear to be of two distinct forms, one clear dull brown, with typical markings, as in Newman's 'British Moths,' p. 285, but with no transverse markings, var. *epomidion*, Haw., the other of a redder colour, and much marbled with transverse ochreous markings. This latter marbled form is the *characteræa* of Hübner.

α. var. characteræa, Hb.—Hübner's fig. 133 may be described as having the anterior wings brown, with a reddish tinge, with the ordinary dark markings, but a number of transverse lines, ochreous outlined with black, gives the variety a very mottled appearance. The darker ground colour shows up very distinctly between the pale line near the hind margin, and the pale line just beyond the reniform. I believe this variety occurs in most British localities. I have taken it in various localities in Kent, and have received it from the neighbourhood of Barnsley (Yorkshire), the New Forest, &c.

β. var. epomidion, Haw.—This is the ordinary form which we get, "brown, without the ochreous transverse markings which occur in *characteræa*." Haworth, in his 'Lepidoptera Britannica,' p. 170, thus describes it: "Alis griseo fuscoque variis strigis tribus pallidioribus obsoletis dentatis." "Lineola basi anticarum alarum sæpe geminata; striga antica undulata (subinde omnino oblitterata), altera pone medium denticulata extus arcuata et subinde quasi geminata; tertiaque juxta marginem posticum altè et irregulariter dentata, et nebulis fuscis adnata. Margo ipse posticus fusco punctatus. Alæ posticæ ut in præcedentibus (*rurea*)."

It must be noticed that in the 'Lepidoptera Britannica,' p. 169, Haworth copies the Linnæan description of *hepatica*, which

he applies afterwards apparently to *rurea*. It must be confessed there is considerable doubt about the types of this species and *rurea*.

Xylophasia, St., *scolopacina*, Esp.

The type is represented by Esper's fig. 1, plate 130. The figure is bad, but certainly recognisable as this species. The following is the description I made of it:—"Anterior wings dark ochreous, with a decided brown tinge, a dark dash at the base of the inner margin. A dark red basal streak, paler (ochreous) orbicular, and reniform dark-centred; a dark line from costa to inner margin; between stigmata a reddish lunule on the inner edge of the reniform; a number of dark long streaks outside the reniform, and a pale wavy line parallel to the hind margin. Hind wings brownish, with a reddish tinge, upper margin dark reddish." Hübner figures (460) *scolopacina*, a small male, with ground colour pale ochreous, the middle of the wing (between the stigmata) and the outer margin reddish, orbicular indistinct, reniform white, with a small white spot beyond the reniform. Guenée says of *scolopacina*:—"It varies much in size and intensity of colour, but the lines are always more distinct than in any other *Xylophasia*" ('Noctuelles,' vol. v., p. 145). Of Freyer's, Plate lxiv., fig. 1—*scolopacina*, I made the following notes:—"Yellow ochreous with a reddish tint, a dark red lineola at base of inner margin, orbicular outlined in blackish, reniform red outlined in whitish; four dark costal streaks above stigmata, a double basal line, a waved line outside reniform, forming almost linear dots on nervures, dark reddish line parallel to hind margin." It will be thus seen that Esper's type and Hübner's figure are much darker than the generality of specimens taken in Britain, while Freyer's is very much like them. I have a specimen captured by Mr. Harrison, near Barnsley, slightly glaucous, but otherwise dark like the type. All my others are much paler. The dark type is also described in Humphrey and Westwood's 'British Moths,' vol. i., p. 160, but the pale form is figured in the same work, Plate xxxii., fig. 8. The paler form is described by Haworth as follows:—

α var. *abbreviata*, Haw.—"Alæ ex hepatico lutescentes, vel subinde saturatiores varie nebulosæ; basi ad latus interius lineola nigra, fascia subfusca in medio costæ valde abbreviata; pone stigmata ordinaria obsoleta, striga tenuis nigra, regulariter et concinnè dentata: tunc striga altera crassior fusco-brunnea juxta marginem posticum, parum undulata; margine ipso ustulato, punctis circiter quinque pallidis; ciliis itidem ustulatis" ('Lepidoptera Britannica,' p. 170). As these pale specimens vary a little *inter se*, I think Haworth's name should include all our paler ochreous forms.

β. var. *nux*, Frey.?—Guenée, in his 'Noctuelles,' vol. v., p. 145, gives this as a probable variety of *scolopacina*. He says of it:—"I have not

seen it, and I do not know whether it constitutes a distinct species, which is very possible. After the figure of Freyer, it is of a larger size, the crest and the thorax are of a deeper brown, and other less important characters." My own note on this is:—"Freyer, Plate cclxx. fig. 3. Like *scolopacina*, but as large as *rurea*."

Xylophasia, St., *zollikoferi*, Frey.

I have been reminded by Mr. Dobrée that I ought scarcely to pass this rare species which has been twice captured in Britain; one in the beginning of October, 1867, by Mr. Harding of Deal, the other by Mr. Tait, at Inverurie, a few miles from Aberdeen, in September, 1871. The former specimen is in the Doubleday collection at the Bethnal Green Museum, the other is, I believe, still in the possession of Mr. Tait. The notice of the first capture as recorded in the 'Entomologist,' vol. v. pp. 29, 30, is by Mr. Doubleday, and is as follows:—"The beginning of October, 1867, Mr. Harding took a large *Noctua* at Deal, which was unknown to me, but which I thought might be *X. zollikoferi*, from M. Guenée's remark that some authors had placed this insect in the genus *Nonagria*, and Mr. Harding's moth certainly resembles a female *N. typhæ* in colour and markings. A short time since I sent it to Dr. Staudinger, and he says it is *X. zollikoferi* var. This species is principally found in Hungary and Russia, but is not common anywhere." The notice of the second capture may be found in the 'Scottish Naturalist,' vol. i. pp. 267, 268, with a very full description by Dr. F. Buchanan White. The type of this species is represented by Freyer in his 'Neuere Beiträge, &c., pl. 184, figs. 1 & 2. Fig. 1 is a male, the "anterior wings of a dull smoky brown colour, with the basal part of the inner margin paler, the nervures of the same dark colour as the other part of the wing; a short, black, longitudinal, basal line just under the median nervure; the claviform distinctly outlined in black, but only the slightest traces of the other stigmata; a row (8) of longitudinal black dots on the nervures just beyond the reniform area; a faint greyish line parallel to hind margin just outside the dots. Hind wings pale grey, with darker outer margin, dusky nervures, and dusky lunule." Fig. 2 is a female. It is like fig. 1, but the basal and median areas pale greyish brown, extending from the inner margin to costa, followed by the dull, dark, smoky brown colour of the male on the outer area (beyond the reniform); basal streak, row of black dots and grey line as in male, but no stigmata. Hind wings much darker than in male, dark smoky brown as in anterior wings, base a little paler." Herrich-Schäffer's two figures, 'Schmet. von Europa,' &c., figs. 103 and 104, also represent dark specimens; fig. 103 approaching most nearly to the British specimens. Strange to say both the British specimens are strikingly pale, the Inverurie specimen being paler than the specimen captured at Deal. Of

this variation Dr. White, quoting Mr. H. Doubleday, writes:—"This (the Inverurie specimen) is a very pale variety. My specimen (the Deal one) is thickly irrorated with black along the nervures, and very closely resembles in appearance a female *N. typhæ*. I sent my specimen to Dr. Staudinger, and he said it agreed exactly with a specimen in his cabinet which was captured in Hungary. He added that it was one of the rarest of the European *Noctuæ*, and he only knew of the existence of a few specimens, two of which were taken near Berlin, and the others in Hungary and Russia'" ('Scottish Naturalist,' vol. i. p. 267). As our two British specimens are so much paler than the type I propose to call them var. *pallida*.

Var. *pallida*, mihi.—The following is Dr. White's description of the Aberdeenshire specimen:—"Front wings shining greyish ochreous, more grey beyond the subterminal line, and the nervures faintly marked out in grey. The only markings are the orbicular stigma, the edges of which are pale ochreous but very indistinct; the claviform stigma also edged with ochreous but almost imperceptible; the reniform stigmata which are more apparent, outlined with ochreous, and the lower end filled in with pale grey; the elbowed line, which consists of a row (in some places double) of small blackish spots on the nervures, and a faint ochreous line near the inner margin; and the subterminal line which is pale ochreous and serrated, especially in the middle where it is like a W, the serrations looking towards the base are tipped with grey. The hind margin is undulated, and between the tips of the nervures is a grey line: the fringes are ochreous, intersected by a darker line; the inner margin is narrowly greyish black. The hind wings are ochreous white with the nervures and the hind margin irregularly ochreous grey. The expansion of the wing is about $2\frac{1}{4}$ inches." Dr. White then adds:—"Herrich-Schäffer 'Schmet. von Europa,' &c., gives two figures of this species. Fig. 103 is most like the Inverurie specimen but differs in being much darker in colour, in having no trace of the claviform and orbicular stigmata, the elbowed line distinctly formed of two rows of dots and no ochreous line on the inner margin, the subterminal line more distinctly marked with grey. The hind wings are much darker, and the expanse of the wings barely 2 inches. Fig. 104 is very different and looks almost like a different species" ('Scottish Naturalist,' vol. i. pp. 267, 268). The Doubleday specimen is so much paler than the type, that I think it may be very well included under this varietal name.

Dipterygia, St., *scabriuscula*, L.

The type of this species is the *scabriuscula* of the 'Systema Naturæ,' 10th edition, p. 516, No. 108, where it is described as follows:—"Noctua spirilinguis cristata, alis deflexis fuscis: margine dorsali posticoque pallidis." "Cristæ in dorso ipsius abdominis 4 pone thoracem gibbum." The same author in the 12th edition of the same work appears to describe the same species under the name of *pinastri*, but in the description of *pinastri* he uses the word "nigris" instead of "fuscis," otherwise

the descriptions are identical. There is a difference in the ground colour, some being much better described by the term "fuscous" than "black." It is described by Haworth under the same name *pinastri*, as:—"Alis nigris, maculâ striatâ cinereâ aquilæ alam simulante ad angulum ani." "Cristata, niger vel ater antennis subferrugineis, thoracis dorso abdomineque cinereis. Alæ superiores posticè undulatum et striatim plus minus cinereæ. Margo tenuior etiam cinerascit. Posticæ alæ fuscæ, ciliis cinereis." Hübner also figures (246) *pinastri*, with normal anterior but bluish posterior wings. This latter is without doubt due to over-colouring. Newman in his 'British Moths,' p. 287 says:—"This is one of those moths which are constant in the arrangement and tint of their colours. I am unable to select from among the numerous specimens which have reached my hands, a single individual to which I can possibly allude as a variety." I have seen no good varieties; but some specimens have the dark portions of the anterior wings much more intense than others. Possibly the greatest amount of variation exists in the quantity of pale longitudinal markings near the hind margin, some having a large number of short longitudinal streaks especially near the apex, others being almost without them; while some have the pale marking (from which it gets its English name "the bird's wing") near the anal angle, and its continuation along the inner margin of a much clearer grey than others; in fact, I have some where this marking is almost absent, and others where it is quite whitish grey with scarcely any darker shading. I have one specimen much below the average size. Guenée in his 'Noctuelles,' vol. v. p. 146 writes:—"Superior wings brown-black, with the inner margin and a large bilobed spot at the anal angle, of a testaceous grey marked with brown streaks."

var. *pinastri*, L.—The Linnæan description 'Systema Naturæ,' 12th edition, p. 851, No. 160, is as follows:—"Noctua spirilinguis cristata, alis deflexis *nigris*: margine dorsali posticoque pallidis." "Cristæ in dorso ipsius abdominis 4 pone thoracem gibbum; characteres in alis atri." (Black instead of fuscous.)

(To be continued.)

ON THE VARIATION OF INSECTS.

By T. D. A. COCKERELL.

(Continued from p. 56.)

m. *Suppression of light markings.*

Papilio asterias asteroïdes, Reak. *Limenitis arthemis*; dimorphic forms, *lamina*, Fab., and *proserpina*, Edw. *Apatura iris iole*, Schiff., Newman, Brit. Butt. 72. *Mamestra persicariæ unicolor*, Stgr.—These must, I suppose, be regarded as cases of partial

melanism; but Mr. H. Goss (Entom. xi. 73), in describing a dark variety of *Chelonia villica* from Brighton, mentions that several dozen larvæ from the same place produced the type, and suggests further that the aberration was due to a diseased condition in the larva. Now this variety exhibited coalescence of the dark markings and suppression of the light ones, which further, was more complete on the right than on the left side, so it seems certain that it had nothing in relation with such cases of melanism as *Pieris napi bryoniae*. I am therefore inclined to separate all dark forms into two groups: 1. True melanisms. 2. Cases of coalescence of markings due to disease. What the precise nature of the disease may be, and which forms precisely are to be classed in either group, is for future investigations to decide.

n. Coalescence of dark markings.

Argynnis bellona fasciata. The zigzag band fused with the outward of the inner markings, forming a wide band (Maynard). *Chrysophanus hypophlœas fasciatus*, Strecker. *C. phlœas fasciatus*, Entom. xi. 25, with fig. (W. P. Weston). *Acronycta tridens fasciata*, with marginal band, Entom. xi. 24. — In these cases the dark markings have coalesced to form bands, such as are normal with other species, and it is hard to consider them entirely as cases of disease. Whatever may be their nature, I think there can be no doubt that they point to the way in which bands were originally acquired in banded species, and very possibly by careful breeding from banded aberrations such as these, a two banded race might be formed.

Argynnis lathonia valdensis, Esp. *A. idalia*. Maynard figures a variety in which the silver spots on underside are partly coalesced.—These two examples of coalescence of the silvery markings in *Argynnis* may be considered here. They probably do not essentially differ from the other cases of coalescence cited above. Silvery markings have, however, probably originated in a metamorphosis of some white pigment, in which case *Anthocharis belia ausonia*, Hb., will be an instance of reversion.

o. Suppression of dark markings.

Nathalis iole irene, Fitch. *Lycæna astrarche deleta*, ground colour of underside pearly white, with the red marginal spots very bright, but nearly all the normal black spots absent. Entom. xii. 185, with fig. *L. icarus icarinus*, and *L. bellargus cinnus*, are also cases of suppression of markings. *L. icarus* ♂ *nigromaculata* (Entom. 1887, 216) is an opposite condition. *Melitæa cinxia paucimaculata*, Newman, Brit. Butt. p. 43. *Pieris rapæ immaculata*, tom. cit. p. 161. *Lomaspilis marginata subdeleta*, Newman, Brit. Moths, p. 101. *Abraxas grossulariata deleta*, tom. cit. 99;

also Proc. S. Lond. Ent. Soc. Pl. i. fig. 2. *Melanippe fluctuata deleta*, Proc. S. Lond. Ent. Soc. 1886, 44. *Calomela sexmaculata subdeleta*, Ent. Mo. Mag. 1885, 224.—The case of *Abraaxas*, in which a many-spotted moth occasionally appears almost or quite spotless, is exactly reversed in the American *Hyphantria cunea*, Drury. Near Washington the type of this insect is spotless white, but further south a variety (*punctatissima*, Smith), is found, in which the wings are profusely spotted with black, while every gradation between these two extremes occurs. (For figures showing variation, see U. S. Dept. Agric., Entom. Div. Bulletin, 10, 1887).

p. *Unusual development of light markings.*

Papilio asterias calverleyi, Grote, "probably caused by the action of cold on the pupa soon after pupating" (G. H. French). *Grapta j-album aureomarginata*. The yellow border to the wings without marks, and bright golden yellow (Maynard). *Vanessa antiopa hygiæa*, Hdrch. (= *lintnerii*, Fitch). According to Maynard, this variety is said to occur in America in the proportion of about 1 to 500, typical = ; he thinks it is perhaps due to reversion. Dr. Lang states that this variety has been taken in Britain. *Zygæna filipendulæ cytisi*, Hb. *Vanessa cardui*, var. from Grahams-town, Proc. S. Lond. Ent. Soc. 1886, 60 (J. J. Weir).—These, of course, are similar in nature to the last, but their cause is very obscure, and probably not the same in every case. I cannot agree with Prof. French that *P. asterias calverleyi* was caused by cold, especially as he says "soon after pupating," at which period the wing-pigments would not have begun to be formed. Besides, this aberration has been taken in Florida, where severe cold does not occur.

(To be continued.)

DESCRIPTIONS OF TWO NEW SPECIES OF THE
COLEOPTEROUS FAMILY CETONIIDÆ.

BY OLIVER E. JANSON, F.E.S.

Clinteria rufipennis, n. sp.

Head coppery green, shining, coarsely punctured, the punctures confluent at the sides and apex, a fine smooth median line, apex of the clypeus rounded, a little reflexed, and with a small central notch. Thorax dull coppery olive, a broad angular band on each side, and a small round spot on the basal lobe pale ochreous yellow, the disk finely and very sparsely punctured. Elytra dull red with five pale ochreous yellow spots on each; the first in the centre about one-fourth from the base; the second nearer the suture, about midway between the base and apex; the third close to the outer margin just beyond the middle; the fourth near the outer apical angle; the fifth between the apical callosity and the suture; the third spot is transverse and sinuous, the others are sub-orbicular; the disk with some

rows of coarse shallow punctures and feebly bicostate. Pygidium dull olive-brown, a large triangular pale ochreous spot on each side, the apex with sparse yellow hairs. Beneath bronzy black, with large ochreous spots at the sides, mesothoracic epimera ochreous above; mesosternal process narrow, the apex compressed; abdomen slightly impressed in the centre. Legs red-brown, posterior femora with an ochreous stripe at the sides, anterior tibiæ with two lateral teeth. Length 14 millim.

Habitat, Colombo, Ceylon.

This species is allied to *C. hilaris*, Burm., but may be at once distinguished by its different coloration and narrow mesosternal process. The specimen described is a male, and was given to me by Mr. Geo. Lewis.

Clinteria caliginosa, n. sp.

Deep black, thorax and elytra dull, the other parts shining. Head closely punctured, a slight longitudinal elevation between the eyes; clypeus impressed on each side, the apex rounded, narrowly reflexed and very slightly emarginate. Thorax with a narrow interrupted white lateral border, very coarsely punctured, the sides rounded. Elytra with four white spots on each; the first in the centre of the disk; the second and third close to the lateral margin between the middle and apex; the fourth between the apical callosity and the suture; the disk feebly bicostate, and with rows of coarse shallow punctures. Pygidium coarsely and transversely strigose, a very small white spot on each side. Beneath very coarsely strigose, and with sparse black hairs at the sides; sides of the abdomen and the legs very coarsely punctured; mesosternal process short and narrow, its apex obtuse and a little divergent; anterior tibiæ with two lateral teeth, intermediate and posterior tibiæ with a large sub-median tooth. Length 12-13 millim.

Habitat, Kodeicanel Mountains, Madras.

The white markings in this species are evidently liable to considerable variation, in one example the lateral border on the thorax is only represented by a small spot at the anterior angle, the discal spot on the elytra is divided into two, and the other spots are very small. In form and sculpture it approaches *C. sexpustulata*, G. P., but the mesosternal process is much shorter, the clypeus is less deeply emarginate, the thorax is more rounded at the sides, and the colour and position of the spots on the elytra is different.

NOTES ON THE NOTODONTIDÆ.

BY THE REV. BERNARD SMITH.

No. 5.—*LOPHOPTERYX CARMELITA* AND *NOTODONTA DICTÆOIDES*.

LESS cannot be said, than that *Lophopteryx carmelita* is one of the most beautiful of our Prominents. My paper on *Notodonta chaonia* (Entom. xxi. 36), elicited the fact that the species was not so exclusively southern as I had considered. It brought me the larva from Scotland. But *carmelita* is known to be a northerner.

insect as well as a southern. Yet I have heard of no captures of late years except in Sussex. It is nowhere common.

The egg is white and conspicuous, yet I never heard of its being found. It is less than that of *Notodonta trepida*.

The larvæ as well as those of *N. chaonia*, and other Prominents, are occasionally cannibal, and in many localities it is not easily reared. Here on a chalky soil I have found no difficulty. The larva might be mistaken for that of *Notodonta trimacula*, but is stouter in the middle, and tapers towards the ends.

The moth pairs readily, and may be found paired generally till the morning. Probably, therefore, a search for the moth on palings or the branches of birch trees would be most successful early in the mornings of May.

I have never noticed a variety of this insect, but northern specimens are much smaller than southern.

Notodonta dictæoides is another interesting Prominent, and its range is from the Highlands to the New Forest. The egg is white, and resembles that of *L. carmelita*, turning almost black however before hatching. The larva is cannibal in its habits from early youth, and it is necessary to isolate them as far as possible. When large the yellow lateral stripe makes this larva easily seen by birds, and I have lost many by the birds drawing them through the muslin sleeves, when fed on the growing trees. The remedy is a double sleeve. This larva likes the shade.

Notodonta dictæoides, as with *N. dictæa*, is in some seasons double-brooded, at least partially. Perhaps one reason why this moth is still a rarity, is the tenacity with which the larvæ cling to the birch twigs. Hence many are wounded by the beating-stick, and still more escape capture. It is probable the larva should be searched for, and though the process is wearisome, it is worth the trouble. This larva seems less attacked by ichneumons than most others of this family.

It is supposed to feed exclusively on the birch, but I have heard that near Doncaster it is found on aspens. This, however, must be considered as the exception which only confirms and proves the rule.

Marlow, December 22, 1888.

NOTES UPON THE BRITISH PTEROPHORI.

By RICHARD SOUTH, F.E.S.

Oxyptilus heterodactylus.

EVERY one interested in Pterophori will be obliged to Mr. C. A. Briggs for correcting the error first made by Dr. Mason, and subsequently perpetuated by me, in assigning *heterodactylus* to Haworth instead of De Villers. Without proof

that this particular insect of Haworth's is distinct from that to which De Villers gave the name of *heterodactyla*, there is, however, nothing in the rectification which can in any way affect Dr. Mason's conclusion as to the identity of *teucarii* and *heterodactylus*.

Stephens evidently considered the *heterodactyla* of De Villers identical with Haworth's insect of the same name, for in his Syst. Cat. Brit. Ins. ii. p. 231, No. 7628, we find it entered thus:—

25; *heterodactylus* (Sam. i. 35). Ph. Al. *heterodactyla*, Villers, E. ii. 535. Al. *heterodactyla*; the spotted black Plume (Haw. Pr. 39), Haw. 479. In Steph. Brit. Entom. Haust. iv. p. 377 (1834), however, Haworth's name is omitted, and the reference is only to De Villers and Steph. Cat.

Platyptilia zetterstedti.

By the courtesy of Lord Walsingham I have lately had the privilege of examining Zeller's type of *P. zetterstedti*. I cannot see that the specimen differs in any way from some examples of undoubted *gonodactyla*, and it certainly is not identical with the insect we know as *zetterstedti*.

In the March number of the 'Young Naturalist,' Mr. Briggs has been good enough to criticise my remarks on this species (*ante*, p. 29), and among other things he says that my now defunct *tæniadactylus* narrowly escaped from being called identical with *farfarella*. We are not told how he arrived at this conclusion, but it is quite clear that no ordinary process of putting two and two together would lead to such an egregious mistake. If I am correct in considering Zeller's *zetterstedti* and *farfarella* to be forms of *gonodactyla*, my *tæniadactyla* is not implicated in the 'bouleversement;' as it is not a variety of Zeller's *zetterstedti*, but of *nemoralis*, Zell., of which species I believe our pseudo *zetterstedti* to be a form. I am sure this was already the view taken by the majority of those who may have read my previous remarks on this species. I must, therefore, apologise to them for explaining that which, of course, they will think required no explanation.

Oxyptilus lætus, Zell.

It will, perhaps, be remembered that I recorded the capture of *O. lætus*, Zell., in N. Devon (Entom. xv. p. 35), and also that Mr. Barrett refers to the capture of undoubted examples of the insect at Folkestone (Ent. Mo. Mag. xviii. p. 178); but Mr. Briggs says in the 'Young Naturalist,' "Of *heriacii* and *lætus* no authentic records of captures in England exist." The author of this statement could not have carefully searched through the entomological journals, or he certainly would not have made any such assertion with regard to *lætus*.

12, Abbey Gardens, N.W., March 17th, 1889.

NOTES UPON CERTAIN PTEROPHORI.

BY J. W. TUTT, F.E.S.

I SHOULD like to call Mr. South's attention to the following point in his 'Contributions to the History of the British Pterophoridae' (Entom. ante, p. 35), where he states:—" *Mimæseoptilus zophodactylus*, Dup. = *loewii*, Zell. Imago:—August. Larva:—September, in the flowers of *Erythræa centaureum*." I think that there can be no doubt that Mr. South wishes to teach the readers of the 'Entomologist' that the larvæ appear in the same year, but after the imago.

May I kindly ask whether Mr. South has ever bred imagos from the larvæ of *loewii* collected in September from the flowers of *Erythræa centaureum*?* or has any one ever seen the larvæ or pupæ the same year in the months following the emergence of the imagos? When I was at Folkestone in the middle of August, 1886, 1887 and 1888, Mr. Austin, of that town, was breeding *loewii* from *Erythræa* flowers, but the flowers were collected in the latter part of June and early July. This is the ordinary time that the larvæ are to be collected; they pupate throughout July and August, stay in the pupal stage about three weeks, and then emerge. These are, at any rate, the data I have noted. The following year, from June to August, the larvæ can be again obtained; but so far as I know, and so far as I can find out, from the time of emergence of *loewii* in August and September to the appearance of the larvæ again in June, we have an almost perfect blank, filled in only by the statement in Stainton's 'Manual,' of "Larva in September," and the same statement in Merrin's 'Calendar' (transcribed probably from the 'Manual'), to the effect that the imago occurs in July and the larva in September. I suppose we

* Mr. Tutt is correct in supposing that the description he refers to was taken from the larva I had in 1881. In 1887 I obtained two other larvæ on September 2nd; these agreed well with my earlier description, and appeared to be full grown. As soon as the opportunity of doing so occurred, I intended to take down a description of the pupæ, but just at the time I went away from home and forgot to take the *zophodactylus* larvæ with me. When I returned on October 5th, two imagines of the "plume" were out, one of which was dead and stiff. Hoping to renew acquaintance with this larva, and obtain at least another chapter in its life-history, I purposely refrained in my note on the species (ante, p. 35) from making public my failure in 1887. However, as Mr. Tutt appears to desire additional information on the point, I am in a position to assure him that larvæ did occur in September, both in 1881 and 1887. The omission of September, ? October, as dates for the perfect insect, was an unfortunate error on my part, which I especially regret, as it seems to have involved others than myself. I had been told that larvæ of *zophodactylus* were to be found in June or July, and my informant was good enough to promise me a supply, but they never came to hand. Mr. Porritt bred imagines from August 23rd to September 1st, from larvæ he received in the middle of August. Mr. Gregson and myself have had larvæ as late as September; therefore with the dates given on Mr. Tutt's authority, the lepidopterist would seem to have a good chance of finding larvæ of *zophodactylus* whenever *Erythræa centaureum* is in flower, and this is from June to September. I may add that I have taken imagines in the last week of August at Ventnor.—R. S.

may safely presume that Mr. South's reference to Mr. Leech's 'Pyralides' (*ante*, p. 35) refers to the description which he (Mr. South) published ('Entomologist,' vol. xviii. p. 99), and where he writes:—"Larva in August and September, in flowers of common centaury." This I should have supposed was based on other authors. But Mr. South goes on, "I have a description of the larva, taken from a solitary example in 1881," &c. But surely this is the larva described more in detail (*Entom. ante*, p. 35), and to which Mr. South adds "September, in the flowers of *Erythræa centaureum*." Here then is the missing link. If Mr. South has got the life-history of this September larva, when it pupated, and in short, its history until it emerged in the August (his own date) following, we shall have learned something we do not at present know. The 'Manual,' in making the larva follow the imago the same year, is in error; the 'Calendar' is in error; but Mr. South has obtained a September larva, and might have cleared up the error, but he perpetuates it by saying, "Imago, August; larva, September." Mr. Gregson (*Entom.* vol. iv. p. 350), who gives the true life-history of *loewii*, mentioned that the larva in that particular season occurred as late as September, but the moths emerged the same year. Mr. Porritt also described the larva in the March number of the *Ent. Mo. Mag.* for 1884.

As far as I know the life-history of *loewii*, it amounts to this:—
 Larvæ:—May, June, July, and early August, in flowers of *Erythræa centaureum*. Pupæ:—July, August, and early September (hung up by abdominal segment among food-plant). Imagines:—Middle of August to middle of September. The remainder of its life-history is, I believe, unknown. Whether the imago hibernates and lays its eggs in spring, or whether they are laid in the autumn, are both points I have heard good lepidopterists give different opinions about. Nothing appears to be known as to the time that the larva hatches, but small larvæ may be found in June.

Like all the other plume larvæ that I know, those of *loewii* are very variable. I made the following note some time ago:—" *Loewii* larvæ vary very much; some have a red stripe, some pinkish, others with scarcely any trace of dorsal or other longitudinal markings. The pupæ vary almost to the same extent; some are green, others quite red, with intermediate forms."

Platyptilia gonodactyla = *farfarella*.—Mr. Charles Briggs, in the current number of the 'Young Naturalist,' has handled some of Mr. South's conclusions pretty correctly; but I should like to ask Mr. South whether *P. farfarella* was not separated from *gonodactyla*, rather because of the difference in time of emergence than from any difference in the imago.* If this is so, I think the

* Certainly not. Prof. Zeller took a specimen on May 29th (*Ent. Mo. Mag.* vi. p. 48).—R. S.

matter of identity was settled when I bred the second brood (vide Ent. Mo. Mag., vol. xxv. pp. 104—106).

Amblyptilia acanthodactyla and *A. cosmodactyla*.—Will Mr. South kindly say what are his reasons for placing these two species as one? * Mr. Porritt says, "I separated the larvæ quite easily before the moths were bred, at any rate the two forms of larvæ produce the two forms of the moth, and vide Ent. Mo. Mag. of November, 1886, and of December, 1885" (*in litt.*). Supposing it is a dimorphic species, does not the *onus probandi* rest on Mr. South's shoulders? Until Mr. South has reared the two species from the same female, I should prefer to look upon them as distinct.

Rayleigh Villa, Westcombe Park, S.E.

NEW SPECIES OF CRAMBI FROM JAPAN AND COREA.

By J. H. LEECH, B.A., F.L.S., &c.

(PLATE V.)

As with the species described in last month's 'Entomologist,' the following new species have been compared with the National Collection, South Kensington, Mr. Moore's and Dr. Staudinger's collections; M. Ragonot, of Paris, our greatest authority on these groups, has also been kind enough to compare my types with his fine collection.

CRAMBUS ORNATELLUS, n. sp., Plate V., fig. 2.

♂. Primaries blackish brown; a longitudinal white streak, slender at the base, gradually increasing in width to the middle of the wing, where it is intersected by a line of the ground colour, its continuation beyond being represented by an ill-defined white patch, extending to the white submarginal line, which latter starts from the costa in an oblique direction towards outer margin, then forming a sharp angle turns in the opposite direction, and terminates on the inner margin. On the costa just beyond the middle are two short white oblique lines; between these and the submarginal is a short white streak also on the costa. Fringes dark brown, with some white scales below apex. Secondaries pale grey-brown, outer margin and costa broadly fuscous. Palpi white, with some blackish scales. Head, thorax, and abdominal junction white. Expanse, 20 mm.

One example taken by myself at Nagahama in July, 1886.

Closely allied to *C. alpinellus*, Hübn., but the hind margin of primaries is nearly straight and the apex is not produced.

* I cannot see any good and sufficient reason for separating them. The colour difference, either in the larval or perfect state, is not, in my opinion, of specific value, seeing that in all other respects the two forms appear to be alike in all the stages of which we have any knowledge. With regard to breeding one form from ova deposited by a female of the other form, I may say that I should not expect to rear the *cosmodactyla* form from a typical female, except such female was obtained in a locality where both forms occurred together; neither should I hope to see specimens of the type form among the progeny of a female *cosmodactyla* taken in a place where the type did not occur.—R. S.



Although agreeing superficially in colour and markings the latter are of a different character.

CRAMBUS ARGENTISTRIELLUS, n. sp., Plate V., fig. 11.

♂. Primaries golden yellow, silvery white along the inner margin and basal half of costa, several longitudinal silvery dashes margined with black on the disk, and a similar but longer dash runs parallel with inner margin; double silvery grey submarginal line elbowed below costa, and edged internally with brownish; black marginal line represented beyond the middle by three black dots. Fringes dark grey, thickly speckled with silvery scales. Secondaries whitish, suffused with fuscous over the discal area; fringes white tipped with grey, and preceded by a black line. Palpi white above, brownish along the sides and partly beneath. Expanse, 23 mm.

Two male examples taken by myself at Gensan in June, 1886, near to *C. hortuellus* and *C. striatellus*, but easily separated from either.

CRAMBUS STRIATELLUS, n. sp., Plate V., fig. 3.

Primaries yellowish brown, with several interrupted longitudinal black streaks, and some brownish oblique costal dashes; submarginal line whitish edged internally with brownish. The dark grey fringes are speckled with silvery, and have a black line at their base which is broken up into dots near the inner angle. Secondaries dark grey, with a slight violet tinge; fringes glossy whitish. Under surface fuscous-grey, pale yellowish along costa and outer margin of primaries. Palpi whitish, tipped and ringed with black. Expanse, 19—22 mm.

Four specimens received from Mr. Manley of Yokohama. Near to *C. hortuellus*, but separated at once from that species by the more decided character of marking.

CRAMBUS DISTINCTELLUS, n. sp., Plate V., fig. 1.

Primaries silvery white, with a few black spots forming an abbreviated basal line, and a series of black spots on the disk representing two angulated parallel lines; submarginal line brownish, curved near the costa and angulated towards inner margin. Fringes white, sprinkled with grey near inner angle. Under surface white, dusted with ochreous brown; inner half of secondaries and fringes of all the wings white. Palpi white above, brownish beneath and along the sides. Expanse, 21—28 mm.

I took five examples of this species at Hakodate in August, 1886. It is quite unlike any species with which I am acquainted.

CRAMBUS NIGRIPUNCTELLUS, n. sp., Plate V., fig. 10.

Primaries white, with some ochreous brown markings at apex; an ill-defined brown line crosses the middle of the wing from costa to inner margin, and another brown transverse line runs parallel with the outer margin, except towards costa where it curves inwards; a conspicuous elongated black spot on the disk has its outer extremity directed towards apex. Fringes ochreous, ornamented with silvery scales, preceded by a dark brown marginal line, on which there are two black dots near inner angle. Secondaries white, tinged with fuscous; fringes white, with a dark brown line at their base. Under surface of primaries whity brown, the whole of the disk clouded with fuscous; secondaries as above. Expanse, ♂ 16 mm., ♀ 24 mm.

An example of each sex taken by my native collector at Ningpo, July, 1886, and a male specimen by myself at Gensan, in July of the same year.

CRAMBUS PURELLUS, n. sp., Plate V., fig. 7.

Primaries glossy white; a brown inconspicuous discal spot; fringes white flecked with grey. Secondaries white, with a conspicuous black line narrowly edged internally with fuscous on outer margin. Palpi whitish. Under surface of primaries shining fuscous. Secondaries white edged along costa with fuscous. Expanse, ♂ 24 mm., ♀ 30 mm.

Four specimens taken by myself at Hakodate in August, 1886, near to *C. immaturellus*, Christoph.

CHILO GENSANELLUS, n. sp., Plate V., fig. 9.

♂. Primaries dark cinnamon-brown, with a transverse series of three black dots on the disk, and seven along the outer margin; on the external edge of these last are some silvery scales, which project into the dark grey brown fringes. Secondaries pale brown. Palpi blackish above, whitish beneath. Under surface of primaries fuscous, secondaries shining whitish grey. Expanse 23 mm.

One example taken by myself at Gensan in July, 1886; two specimens by native collector at Hakodate, June, 1887.

NEPHOPTERYX BICOLORELLA, n. sp., Plate V., fig. 5.

♀. Primaries, basal half pale reddish brown, darker towards inner margin; outer portion dark greyish brown; a dark brown line edged internally with whitish traverses the disk of the wing from costa, where it makes a slight bend, nearly to the inner margin; submarginal line wavy, pale brown. Fringes dark grey, intersected by a line of paler grey. Secondaries fuscous-brown. Expanse, 27 mm.

One specimen coll. Pryer, labelled 'Tokio.'

This species is nearly allied to *N. insignella*, Mn.

ELAMOPALPUS BIPARTITELLUS, n. sp., Plate V., fig. 4.

Basal half of primaries chocolate, darker externally, and its limit bounded by a whitish band; the outer portion of the wing is pale chestnut, shading into fuscous-brown towards outer margin; submarginal line faint. Secondaries grey-brown, darker along the costa and outer margin. Fringes of all the wings dark grey-brown. Expanse, 20 mm.

One example coll. Pryer.

MELITENE BIFIDELLA, n. sp., Plate V., fig. 8.

♀. Primaries reddish brown, suffused with fuscous; basal third blackish, its external edge is bordered by a stripe of violet-grey, followed by a blackish band; central fascia blackish, broad, and much expanded towards costa, where it encloses a patch of violet-grey scales; marginal band blackish, separated from the central by an undulated line of the ground colour, and edged externally with violet-grey. Fringes dark grey-brown. Secondaries and under surface fuscous. Expanse, 23 mm.

One example coll. Pryer.

PROPACHYS FLAVIFRONTALIS, n. sp., Plate V., fig. 6.

♂. Fuliginous grey-brown, appearing darker between the veins. Secondaries slightly browner than the primaries. Head yellow, collar blackish, edged with yellow. Under surface fuscous-grey. Legs blackish, tarsi pale brown. Expanse, 36 mm.

I took two male specimens at Tsuruga in July, 1886, and my native collector a female example at Ningpo, in the same month of that year.

HUFNÄGEL'S TYPES.

By J. W. TUTT, F.E.S.

PROBABLY of the objections which were raised to the 'Entomologist' list of Lepidoptera, none was more serious than the fact that some of the names used were not able to be traced by even the most scientific lepidopterists in this country. To those who had previously used Staudinger's Catalogue, these names, the synonymy of which was so objectionable, and which had apparently been transcribed direct from his Catalogue, did not come as such a striking innovation, as to those whose knowledge of nomenclature did not extend beyond the limits of one of our ordinary "Exchange Lists." Only last year a really good lepidopterist, who knew more of synonymy than I did, asked me why I used Hufnägel's names, and whether I had ever seen the "Magazine" that was supposed to contain them. I was obliged to confess that neither the "British Museum Library" nor our "Entomological Societies' Libraries" gave me any help, and that, so far as I knew, a copy did not exist in Britain. However, as it was absolutely necessary in getting out my "Variety" papers for the 'Entomologist' to know what the types were like, I wrote to Dr. Staudinger for help; but the attempt was, as many of my friends prophesied, a failure. However, I obtained the assistance of my kind correspondent Herr Hoffmann, of Hanover; and he, with the aid of a Berlin naturalist, was able to get me copies of the description from the library there. The descriptions are—like all those of the same age—poor, but equally good (or bad) with others, the acceptance of which is not questioned. The following are the first three:—

(1) 62. P. 308. "*Phalæna monoglyphæ*. Der Treiber." Description:—"Theils bläulich, theils hell theils dunkel grau, mit einem lateinischen W an dem hintern Rande." Locality:—"In den Fugen der Zäune u. Bäume." Time of appearance:—"Junius und Julius." Size of moth:—"Von der zwoten grösse." Common or rare:—"Setten."

(2) 96. P. 414. "*P. matura*. Die Glanzmotte." Description:—"Braungrau mit weissen u. blassgelben Zeichnungen, die meistens braun gerandet sind. Die Unterflügel blassgelb mit einen breiten braunen Rande." Locality:—"Auf den Blättern der Eichen." Time of appearance:—"Julius." Size of moth:—"Von der zwoten grösse." Common or rare:—"Sehr setten."

(3) 97. P. 416. "*P. cursoria*. Der Rothbart." Description:—"Gelblichgrau mit 2 braunen ausgeschweiften u. ausgezackten u. 2 grauen geschlängelten Ruerstreifen." Locality:—"In den Fugen der Zäune."

Time of appearance:—"Junius." Size of moth:—"Von der dritten größe." Common or rare:—"Etwas setten."

A running translation of these would be:—

1. *P. monoglypha*. "Partly bluish, partly light, partly dark, grey, with a Latin W on the hind margin." "In the rifts of fences and trees." "June and July." "Of the second size." "Rare."

2. *P. matura*. "Brownish grey, with white and light yellow markings, which are generally surrounded with brown. Hind wings light yellow, with a broad brown margin." "At the leaves of the oaks." "July." "Of the second size." "Very rare."

3. *P. cursoria*. "Yellowish grey, with two brown curved and toothed, and two grey wavy transverse lines." "In the rifts of the fences." "June." "Of the third size." "Rather rare."

The "partly bluish" of *monoglypha* refers, I should imagine, to the slight iridescence we find on some specimens.

Matura "at the leaves of oaks." This is strange, but probably the few specimens ("very rare") that Hufnägel had seen were attracted thither by "honey-dew."

Cursoria. "June." A very early date. I doubt whether it ever occurs in Britain so early, although I have captured its congener, *tritici*, as early as June 29th and as late as September 12th, at Deal.

My only idea of publishing these descriptions is to convince some of my friends that Hufnägel's descriptions really exist, and there is little doubt in my mind that Standinger was right in making use of them.

Westcombe Park, March 7, 1889.

LIFE-HISTORY OF *GEOMETRA PAPILIONARIA*.

By GEORGE J. GRAPES.

In expanse of wing and beauty this Geometer is undoubtedly pre-eminent among our emerald moths, and well worth the trouble of rearing, not only on this account, but on that of its belonging to a somewhat numerous species of Lepidoptera that pass the winter in a larval state.

I have several times succeeded in rearing this insect through all its phases of existence, but not till lately have I taken any real interest in noting its life-history.

The ova are laid chiefly on birch early in July. At first they are of a pale straw-colour, changing in about ten days to orange-red, and to a bluish black on the emergence of the caterpillar, which occurs between the middle and end of the month.

The larva is black when first hatched, and about an eighth of an inch in length. Before hybernation the young caterpillars feed up on the cuticle of the foliage, the denuded parts having a

very pretty reticulated appearance. After hybernation they devour both cuticle and veins. The larva of the female is about a quarter of an inch in length, of a dull orange colour, with its anal and middle segments reddish brown; that of the male is paler, with less orange, and frequently wholly of a dingy greyish hue. In autumn, when the trees begin to assume those well-known sombre tints so characteristic of an English landscape, they, contrary to some authors, cease to feed, and settle for their long winter sleep on the branches of various trees; and in colour, shape, and general appearance strongly resemble when hybernating on birch, and probably on other trees, rudimental branchlets, for which, at first sight, they may be easily mistaken. This resemblance is, however, only fully acquired when the shelter of the foliage is gone, and evidently forms their chief protection against the ravages of insectivorous birds. During hybernation they become much reduced in size, and then present a very shrivelled appearance, particularly when seen by the aid of a lens, which also discloses a reddish tinge, not otherwise observable. The caterpillars may be obtained in September by beating birch (*Betula alba*), hazel (*Corylus avellana*), and, I am informed, alder (*Alnus glutinosa*), &c.; but the moth seems to prefer depositing her ova on dwarf and stunted birches, especially those lopped or broken, situated in sheltered positions. Such trees are less affected by tempest, and the parent, in selecting them as nurseries for her offspring, would appear to be impelled by exceptional instinctive powers, in support of which I may state that I have rarely ever beaten the larva from tall birches, and then only from the lower branches. The larva of this insect, in common with other hybernating species, such as *Lasiocampa quercifolia*, *Metrocampa margaritaria*, *Boarmia repandata*, *B. rhomboidaria*, *B. roboraria*, *Hylophila bicolorana*, with which I have had experience, exhibit the same restlessness on warm days in early spring, and in the absence of leaves feed on buds and tender twigs.

About the middle of April a perceptible change takes place in the hybernating hues, which gradually by a series of moults, during which the autumnal tints more vividly reappear, intermingled with yellowish green, give place to that lovely and delicate shade of green acquired by the adult larva,—a change singularly coincident with that which the foliage undergoes from the bursting of the bud to the full-expanded leaf; and here at this, the third and most interesting period of its larval state, resemblance in colour, no doubt enables it frequently to elude the vigilance of its enemies.

The common form of the larva is emerald-green, with a broad and not very regular reddish brown dorsal stripe, and with the segments humped, as follows:—Second and fourth segments minutely humped; third and twelfth uni-humped; third hood-

shaped; sixth, eighth, and ninth bi-humped; seventh bifid-humped, and most conspicuous of all the humps. There is a very beautiful variety of the male larva, of which I was not previously aware, the ground colour being of a pale yellowish green, with a broad dorsal reddish brown stripe, and two lateral rows of lozenge-shaped blotches, two on each segment, of same colour as stripe. This variety, contrary to the common form, retains its colouring all through the larval state, and exactly simulates the reddish brown catkins of the birch, so much so that three or four catkins, attached to the upper surface of a leaf, so deceived me that I imagined I had more larvæ of the variety than was really the case. I observed that the ground colour of the pupa of the variety is of a creamy white, slightly suffused with the palest green, and that the wing-cases and segments of the body of imprisoned imago are sharply defined by dark green; also that moths bred from such pupæ are of an intenser green than those of the common form.

It is noticeable that the larva of the common form, pupa, and perfect insect are all green; and the moth is probably a unique instance of a lepidopterous insect preserving the same colour throughout all its metamorphoses.

The perfect insect often attains a maximum size of about two and a quarter inches, and in localities where it abounds it may be easily netted at dusk about the end of July, though it is somewhat a swift flyer.

Berkeley Villa, Charlwood Road, Putney, S.W.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

PIERIS RAPÆ IN FEBRUARY.—On February 28th, when visiting in my parish, I saw a white butterfly fluttering to the ground in one of the streets of Portlaw. The insect was soon captured, and I was much astonished to find a perfectly fresh specimen of the above species. The sun was very hot, though last night was the coldest this winter, the thermometer registering 12 degrees of frost.—(Rev.) WILLIAM W. FLEMYNG; Clonegam Rectory, Portlaw, Co. Waterford, February 28, 1889.

VARIETY OF PIERIS BRASSICÆ.—I have recently seen in a very old collection a curious variety of this species. The ground colour is sulphur-yellow as in the var. *aurea* of *Pieris rapæ*. It is the best variety of this species that has come under my notice, the next best being in the collection of the late Nicholas Cook, the wings in the latter being suffused with smoky. In Mr. Gregson's collection was one with the veins partly bright green. All these specimens are males. Mr. Hardings, of Shrewsbury, sent me several specimens, fed up on canary creeper, with the fringes bright yellow.—S. L. MOSLEY; Beaumont Park Museum, Huddersfield.

DEILEPHILA GALII IN KENT.—An unrecorded capture of *Deilephila galii* was made here in August last, flying about sweet williams in early twilight.—ARCHIBALD GOSTLING; Woodfield, Gravesend, March 19, 1889.

CHÆROCAMPA CELERIO NEAR TAUNTON.—A specimen of *Chærocampa celerio* was caught in the neighbourhood of this town last year. I don't remember hearing that a specimen has been caught in this district before.—J. BUCKLAND, Jun. ; 13, East Street, Taunton, March 11, 1889.

SMERINTHUS OCCIDENTALIS IN COLORADO.—With reference to my paper (Entom. xxi. 298, *et seq.*), I should mention that the *Smerinthus* found at Cottonwood Springs is confirmed as *S. occidentalis*. Mr. H. W. Nash writes that it is very common at Pueblo, the larvæ feeding on cottonwood. On page 303, the var. of *Quercus undulata* should be *cinerior*. "*Ilybius picipes*, Kibb.?" on page 304, now proves to be *Agabus tristis*, Aubé. Two other species of *Agabus* have been collected in Custer Co., but these are in the western part of the county, viz., *A. parallelus*, Lec., and *A. intersectus*, Lec.—T. D. A. COCKERELL; West Cliff, Colorado, December 21, 1888.

HYBERNATING LARVÆ.—I have some larvæ of *Uropteryx sambucaria* (Entom. ante 21) feeding on ivy in a bottle of water in a room with no fire. They have been feeding and slowly growing for four months. I think this larva is usually easily reared.—S. ROBINSON; Clapfield Terrace, Winchmore Hill, N., January 14, 1889.

EARLY APPEARANCE OF PHIGALIA PEDARIA.—I took a male *P. pedaria* off a Chester gas-lamp on the evening of January 19th. I was not surprised, as our almost uninterrupted warm winter brought primroses, violets, and even fruit trees into bloom at Christmas.—J. ARKLE; 2, George Street, Chester.

FOOD OF NYSSIA ZONARIA.—Last spring Mr. Arkle of Chester sent me some larvæ of *Nyssia zonaria*, with instructions to feed them on any of the willow tribe. I tried them with several species, including willow, for a week but with unsatisfactory results. Then I referred to Stainton's 'Manual of Butterflies and Moths,' and there found yarrow was given as their food-plant, which I gave them and saw they ate it very readily. I have since acquainted Mr. Arkle with my experience, thinking he might like to mention yarrow in addition to the willows another time. In reply he suggested that I might send a note to the 'Entomologist,' as *zonaria* had never fed on yarrow with him nor with any of his acquaintances. It was a fine healthy plant and growing in the sun I fed them from, which may make some difference.—F. MILTON; 164, Stamford Hill, N., January 19, 1889.

AMPHIDASYS BETULARIA, BUFF VAR.—A communication from Mr. J. Rodgers of Oldham (Entom. 49) refers to a black variety of *Amphidasys betularia* having been taken in copulâ with a buff variety of the same species. I was glad to see this note, for although the black variety is common in this district, to capture a buff in copulâ with a black one is remarkable. It is now a good many years since the Middleton entomologists were breeding this buff variety, and I often think it was a great pity that no record of this singular variety should have been made. I believe some are still in the hands of Councillor J. Thorpe of Middleton. It would be interesting to know something of this remarkable strain, and whether it has been totally lost.—JOSEPH CHAPPELL; 29, Welbeck Street, Chorlton-upon-Medlock, Manchester, February 19, 1889.

STIGMONOTA RAVULANA IN RENFREWSHIRE.—In June, 1888, I was in company with my friend, Mr. Watson, collecting *Coccyx cosmophorana* in Renfrewshire, when one of us took *Stigmonota ravulana*.—J. B. HODGKINSON; Eilerslie, Ashton-on-Ribble, Lancashire, February 23, 1889.

LATE LEPIDOPTERA IN 1888.—In 1888 *Euchloë cardamines* was out so late as June 25th in South Wales. The cold and wet summer appeared to have affected the second emergence of *Lycæna icarus* on the Cotswold Hills in Gloucestershire. They were only generally coming out so late as September 12th, and this also was the case with *L. astrarche*, the former were in the greatest profusion in the second week in August, 1887. On December 5th, a specimen of *Plusia gamma* came to light, and throughout November many came to ivy bloom in this district. With regard to larvæ, on October 1st I found a specimen of *Acronycta leporina*, feeding on sallow; this fed well until late in November, when it died in going through its moulting. The long silky hairs in this example were of canary yellow, and the body dark in colour. One specimen taken in July, feeding on birch, was pale green with white hairs. On November 15th a larva of *Sphinx ligustri* was still feeding; as also were on November 23rd many larvæ of *Pieris brassicæ*.—T. B. JEFFERYS; Clevedon.

BACTRA FURFURANA IN NORFOLK.—Perhaps the fact may be worth recording, that about a dozen specimens of *B. furfurana* were taken last August by my brother and myself while collecting on a piece of marshy land in West Norfolk. The insect occurred fairly commonly, and I have no doubt many more might have been secured if we had wanted them.—GEORGE BALDING; Ruby Street, Wisbech.

PRIONUS CORIARIUS, L.—Respecting the occurrence of *P. coriarius* near London (Entom. 77), I do not consider the beetle at all rare in the Epping Forest district, as some dozen or more examples have in recent years been submitted to me for identification; indeed, two specimens came under my notice last year. Four were exhibited by me in November, 1887, at the Exhibition held by the South London Entomological and Natural History Society; all of these were from Loughton. Seven specimens were also shown at the exhibition of the City of London Society, on March 21st, 1889, many being of comparatively recent capture. The best time to search for it is during the first and second weeks in August, on the trunks of oak-trees.—G. A. LEWCOCK; 73, Oxford Road, Islington, N., March, 23, 1889.

LEPIDOPTERA NEAR LEICESTER.—I have taken the following Lepidoptera which are not common in this district:—*Sesia asiliformis* (*cynipiformis*), caught on ragwort at Bradgate Park, August 7th, 1888; *Phigalia palaria*, female, hatched from pupæ, January 20th, 1889, found January 13th, 1889, at root of an oak; *Amphidasys strataria*, caught March 14th, 1888, in Leicester; *Cidaria silaceata*, caught June 13th, 1888, at Bradgate; *Pericallia syringaria*, caught August 6th, 1888, in a private garden near Leicester.—C. B. HERDLY; Stonegate Road, Leicester, January 23.

NOTES FROM CANNOCK CHASE.—In warm seasons *Eupithecia linariata* is, I believe, said to be double-brooded. This can hardly be the case with *E. pulchellata*? I took a lot of larvæ of the latter at the end of July last, and from them emerged two imagines on the 27th and 29th of August.

This is the more extraordinary as last year was anything but a warm season. I have examined the rest of the pupæ, which were kept out of doors, and found them all healthy; so I am inclined to look on the occurrence as a freak of nature. I took a specimen of *Porthesia similis* on October 2nd, and *Xylophasia monoglypha* was common about that time. I beat a larva of *Dicranura bifida* from birch on September 13th last; both the food-plant and the time of year being extraordinary. Poplar abounds in the neighbourhood, but I have never taken the insect on the Chase before. I would suggest that the birch-feeding larva of Ochsenheimer and Freyer, mentioned by Mr. Kirby (Entom. xxi. 275), is that of this insect. At any rate their description is more applicable to *D. bifida* than to *D. bicuspis*. I took larvæ of *Acronycta leporina* from birch, alder, and poplar, the latter tree produced the yellow var. of the larva only. The best of the imagines taken last year were *Argynnis aglaia*, abundantly, *Hepialus sylvanus*, also common. *Porthesia chrysorrhæa*, a rare insect in that district. *Acronycta leporina*, *A. rumicis*, *Neuronia popularis*, *Hydræcia nictitans*, *H. micacea*, *Gortyna ochracea*, *Caradrina alsines*, *C. taraxaci*, *C. morpheus*, and *C. quadripunctata*. *Miana literosa*, *Orthosia suspecta*, *Polia chi*, *Noctua glareosa*, *N. augur*, *Amphipyra tragopogonis*, *Hadena protea*, *H. glauca*, *H. dentina*, and *H. contigua*, while *Plusia gamma* was the insect of the year, as it swarmed everywhere. *Amblyptilia acanthodactyla* was to be taken flying over the heather blossoms. I must not leave out *Calocampa solidaginis*, concerning which I can endorse Mr. Thornehill's remarks; and I feel sure any one searching the dried twigs, sticks, &c., on the ground in the localities where this insect is found, will be amply rewarded; as not only will he get them in good condition, but he will be astonished at their abundance. I beat from birch, besides those larvæ enumerated above, some of *Lophopteryx camelina*, *Notodonta dictæoides*, *N. dromedarius*, *Drepana lacertinaria*, and *D. falcataria*, and a lot of others. Poplar yielded *Notodonta dictæa* in plenty, with *Smerinthus populi*, *Dicranura vinula* and *Acronycta megacephala*. From Scotch fir I got *Panolis piniperda*, *Eupithecia indigata*, &c., and I saw a larva of *Acronycta alni* beaten from a birch tree on the Chase. I am now investigating that dreaded enemy of the entomologist commonly called "grease," and would be much obliged if any reader of this would send me *abdomens only* of moths that have greased, those of large-bodied moths (e.g. *D. vinula*) preferred. I will gladly pay postage.—R. FREER; St. Mary's Hospital, Paddington, W.

NEW FOREST NOTES.—During the latter half of July, 1888, part of which time I was accompanied by my friend Mr. H. T. Dobson, several species of Lepidoptera were found in profusion in the neighbourhood of Brockenhurst, notably *Limenitis sibylla*, which occurred more or less commonly in all the enclosures. At Hurst Hill, so many as twenty specimens were counted upon one bramble bush. We also observed that they were much more easily captured than on any of our previous visits to this district. Later on *Argynnis paphia* was as abundant as usual, but the variety *valesina* was seldom met with. *Thecla quercus* was plentiful but local. By far the greater proportion of those observed were crippled, helplessly fluttering on the bracken. *Vanessa polychloros* had not yet emerged, but the larvæ must have been plentiful enough, judging from the traces left on the willows. Both *Argynnis aglaia* and *A. adippe* were scarce. One fine pale *Apatura iris* was taken at rest on the fern; this specimen had evidently only

recently emerged, and was the only one seen. Sugar attracted a large number of common things, *Caradrina alsines* absolutely swarmed. Among other species were *Noctua brunnea*, *N. triangulum*, *Aplecta prasina*, *A. nebulosa*, *Leucania turca*, *L. conigera*, *L. comma*, *Tryphæna fimbria*, *Epunda viminalis*, *Nola confusalis*, *Calligenia miniata*, and *Macaria alternata* (one example). Neither *Catocala promissa* nor *C. sponsa* had put in an appearance before our departure. Although many larvæ were abundant in the Forest in June, it was not the case from the middle to the end of July, as larva-beating turned out very unprofitable. The only species worth mentioning which fell by our united exertions were *Amphidasys strataria*, *Ennomos erosaria*, *Psilura monacha* (very commonly), *Notodonta trepida* (one specimen), *N. trimacula* (three examples only), *Asphalia flavicornis*, *A. ridens* (nearly all ichneumoned), and *Hoporina croceago*. By digging pupæ, *Xylina rhizolitha* and *Petasia sphinx* were obtained. *Nemeophila russula* (both males and females) were freely taken on the heath. The dearth of Geometers on the wing at dusk was particularly noticeable. I have omitted to mention the capture of a very large dark form of *Boarmia abietaria*, a specimen of *Epinephele ianira*, with partially bleached hind wings, and a dark variety of *Argynnis adippe*.—ALFRED T. MITCHELL; 5, Clayton Terrace, Gunnersbury, W., January 12, 1889.

LEPIDOPTERA OF PORTLAND—CORRECTIONS.—Kindly make the following corrections in "A Year's Work in Portland" (Entom 56):—Instead of *Phycis ornatella*, read *P. adornatella*. Instead of *Acidalia ochrearia*, read *Aspilates ochrearea*. For *A. trigeminata*, read *A. dimidata*. For *S. phæoleuca*, read *mercurella*, var. *portlandica*. Erase *O. parvidactylus*, add *Crambus salinellus* and *L. microdactylus*.—C. E. PARTRIDGE; The Castle, Portland; March 15, 1889.

"MIMICRY" AND "PROTECTIVE RESEMBLANCE" IN INSECTS.—The various guises which insects develop in relation to their surroundings is one of the most interesting of their characteristics which can occupy the attention of observers in the field. Mr. Scudder's article in 'The Atlantic Monthly Magazine' for February, 1889, entitled 'Butterflies in Disguise,' bears testimony to the increasing popularity of the treatment of such subjects. Without being too technical for the general reader, Mr. Scudder has, as might be expected, presented a thoroughly reliable account of some of the more remarkable devices, by means of which butterflies secure greater immunity from their foes. It is, however, rather to be regretted that he omits to distinguish between the *two different kinds* of protection to which they have resort. Although it may be true that the means by which the end is attained is primarily the same in each case, there is so marked a distinct difference practically, and also in idea, between the *active* conditions which, in the case of mimetic species, permit certain species to assume the appearance in outer garb of species of quite different genera, and the *passive* conditions under which, with the operation of natural selection, many other species acquire so close a resemblance to their usual lodgment, that a distinction should always be made, by the employment of different terms of expression. The distinction has always been maintained by such writers as Wallace and Bates,—the first discoverers of these forms of protection,—Meldola and Poulton, but it is still quite usual, as I have frequently noticed, for writers on the subject to confuse the ideas, to the

detriment of the points they have dealt with. I have, therefore, thought it would be well to call attention to the distinction. There is objection, no doubt, to the introduction or change of terms already in use, but I nevertheless think it would be an improvement to definitely separate the two classes (active and passive) under the more precise terms—*mimicry* and *simulation*. The latter term has the advantage of being a single word, and is besides more expressive of the difference required to be implied.—WILLIAM WHITE; 4, Mecklenburgh Square, W.C.

SIREX IN NORTH WALES AND CHESHIRE.—I saw a fine specimen of *Sirex gigas* at Bettws-y-coed, N. Wales, on September 17th, 1888, which was flying about the railway station, and finally settled upon a man's arm, causing no little sensation among the bystanders, who took it to be a very large hornet, or something worse. I should imagine that the specimen must have been a genuine native of the district, as there is much timber about, and certainly no need for foreign importation. I may also mention that *Sirex juvencus* was for many years established in a small fir-wood at Rock Ferry, Cheshire, where I frequently saw specimens; I have not visited the locality lately, so cannot say if the species occurs there still.—WILLOUGHBY GARDNER; 18c, Exchange, Liverpool.

SIREX JUVENCUS IN LONDON.—My insect, referred to by Mr. E. R. Dale (Entom. 17), I think must have come from one of the factories or timber-yards in the neighbourhood. Some years ago I caught three examples of *Sirex gigas* in a pianoforte factory at Wood Green, where a quantity of pine timber was used, but not being then a collector I destroyed them.—S. ROBINSON; Clapfield Terrace, Winchmore Hill, N.

DOLOMEDES FIMBRIATUS IN IRELAND.—A few years ago, when searching for the rare little water-snail, *Limnæus involutus*, Harv., in the small lake which lies on Cromagloun Mountain, above the Tower Lodge, I met with a large and handsome spider, which I was not able to capture, and I suppose it then escaped into the water. But, on visiting this lake a second time with some friends, we succeeded in capturing the spider, which, as I anticipated from what I had seen of it, proved to be the rare and local species, *Dolomedes fimbriatus* (Clerck), long known in the fens of Cambridgeshire, but which I believe I was the first to find in Ireland.—A. G. MORE; 74, Leinster Road, Dublin.

NEWSPAPER ENTOMOLOGY.—Now that the "Institute of Journalists," which was lately paraded before the public with such ceremony, has commenced work, it is to be hoped that a little elementary science-teaching will be impressed upon its members. We have on several occasions given examples of "Newspaper Entomology," and here is another, showing the necessity for some attention among "reporters" to more exact definition of such words as "species." The London 'Daily Chronicle,' of Feb. 19th, 1889, in reporting a lecture by the late Rev. J. G. Wood upon "Ants," says he "spoke chiefly of that wonderful species of ants known as the Hymenoptera;" again, "at one period of the year there appeared some 50,000 small bees, which were incessantly at work."—JOHN T. CARRINGTON.

ERRATUM.—Page 77, line 28—29, for "the part if any," read "the vast if any."

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*March 6, 1889.*—The Rt. Hon. Lord WALSLINGHAM, M.A., F.R.S., President, in the chair. The Rev. W. F. JOHNSON, M.A., of Armagh; the Rev. C. F. THORNEWILL, M.A., of Burton-on-Trent; and Mr. C. R. STRATON, F.R.C.S., of Wilton, were elected Fellows. Mr. F. P. PASCOE exhibited several specimens of the Saüba Ant (*Æcodoma cephalotes*), from Pará, carrying portions of dried leaves. It seemed questionable whether the leaves were collected by the Ants for the purpose of making their nests or for the sake of some fungus which might be growing on them. Mr. JENNER-WEIR exhibited, and read notes on, specimens of a Butterfly (*Tirumala petiverana*), from Mombaza, Eastern Africa. Mr. J. H. DURRANT exhibited a living larva of *Cossus ligniperda*, which had entirely lost its ordinary colour and had become first pink and then white. He attributed the change, and subsequent loss, of colour, to the fact that it had been deprived of its natural food and fed for eighteen months on pink paper, with which the box in which it was kept was lined, and subsequently on white cardboard. Mr. M'LACHLAN remarked that the most extraordinary peculiarity about this larva, in addition to the loss of colour, was the absence of the usual odour of *Cossus*. Lord Walsingham observed that it was questionable whether the colours of larvæ were dependent on the colours of their surroundings, or whether they were affected by the contents of the intestinal canal. Prof. MELDOLA said that the caterpillar exhibited having eaten the pink paper had most probably become dyed by the colouring matter, and he did not think the observation had much bearing on the question of the protective colouring of caterpillars. It was well known to physiologists that certain dye-stuffs could be introduced into the tissues of animals by mixing the colouring matters with the food, and paper was frequently stained with coal-tar dyes such as eosin, magenta, &c., so that it was simply a case of direct dyeing of the larva. Mr. W. WHITE observed that two extreme forms of a larva might often be found feeding side by side on the same tree or shrub, so that the colour of a larva could not be altogether governed by the colour of its food. Mr. B. A. BOWER exhibited a specimen of *Parasia neuropterella*, bred from heads of *Centaurea scabiosa*, and said he believed the species had not been previously bred. He also exhibited series of *Coleophora olivaceella*, *C. solitariella*, and *Laverna subbis-trigella*. The President remarked on the beautiful condition and setting of the specimens. Mr. WHITE exhibited a series of male and female specimens of *Orgyia thyalina*, belonging to Mr. LEECH, and obtained by the late Mr. H. J. S. PRYER in Japan. Some of the females had their wings fully developed, and some of them were semi-apterous, as is usual with the females of this genus. Mr. WHITE remarked that he knew of no other species of the genus in which the females had fully-developed wings. Lord Walsingham, Prof. MELDOLA, and Mr. R. SOUTH took part in the discussion which ensued. Lord Walsingham exhibited specimens of preserved larvæ of *Eupithecia extensaria*, from King's Lynn, Norfolk; also a preserved larva of *Smerinthus ocellatus* and one of *Sphinx ligustri*. The larva of the last-named species was a variety, and the President remarked that it was the only one of this species he had ever seen. The Secretary read a communication from the Rev. Dr. WALKER, announcing his intention of making an expedition to Iceland this year, from the 23rd June to the 29th July, and asking that any entomologists who might wish to accompany him would send him their

names. Mr. Gervase F. Mathew communicated a paper entitled "Descriptions and Life-Histories of new species of Rhopalocera from the Western Pacific."—H. Goss, *Hon. Secretary*.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—February 28th, 1889. T. R. Billups, F.E.S., President in the chair. Miss K. Hinchliff, of N. Devon; Messrs. J. F. Perry, of Birmingham; A. Nott, of Brixton; H. More, of Rotherhithe; G. J. Randall, of Brixton; W. H. McLachlan, of Clapham; and J. Smith, of Plumstead, were elected members. Mr. R. Adkin exhibited *Anerastia lotella*, from Forres, Norfolk, and Kent; *Dioryctria abietella*, from Forres and Kent; *Crambus dumetellus*, from Forres, with *C. pratellus*; and *C. dumetellus*, from Kent, and *C. erucellus*, for comparison; and called attention to the close resemblance of the Forres *dumetellus* to the Kentish *pratellus* in colour and size, but that the markings were clearly those of *dumetellus*. In answer to Mr. Tugwell, Mr. Adkin stated that the specimen of *D. abietella* from Kent, was taken within a few miles of Deal, among a clump of about twenty fir-trees. Mr. Robinson exhibited varieties of *Agrotis segetum* and *A. exclamationis* from Hunts. Mr. Manger, Coleoptera from Darjeeling, India; and Mr. Billups, over forty species of Arachnida, including three rare and local species, *Heliophanus flavipes*, *Balbus depressus*, *Pachygnatha degeeri*.

March 14th, 1889.—John T. Carrington, F.L.S., Vice-President in the chair. Mr. A. Horne, of Aberdeen, was elected a member. Mr. Percy Russ exhibited a large number of species of Lepidoptera taken in the neighbourhood of Sligo, including *Aporophyla lutulenta*, var. *luneburgensis*, and many other local forms and varieties. Mr. Adye, series of *Dasycampa rubiginea*, and varieties of *Xanthia flavago*, taken in Hampshire. Mr. R. South, a curiously coloured specimen of *Zygæna filipendulæ*, and what he thought was a variety of *Hadena dentina*, both received from Mr. Baxter, of St. Ann's-on-Sea. Mr. R. Adkin, two dwarfed specimens of *Lycæna corydon*, an underside of the male of *L. icarus*, with the black central dot of the lower of the two basal spots on the superior wings absent, and the outer light ring elongated; also specimens of *Endotricha flammealis*, *Scopula ferrugalis*, and *Rhodophæa marmorea*, all from the Sussex coast, 1888. The Secretary read a note from Mr. T. D. A. Cockerell, on *Pyrausta borealis*, and an aberration of *Dermestes fasciatus*, having the left elytron grey below the grey band, almost as grey as the band itself, with but little black marbling, the right elytron below the band black, with a trace of pale marbling, probably this was due to partial atavism. Mr. Tugwell read a paper "Practical Hints on breeding Macro-lepidoptera," upon which an interesting discussion ensued.—H. W. BARKER, *Hon. Sec.*

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—An exhibition in connection with this Society was held on March 21st last, at the Albion Hall, London Wall. The entomological exhibits were very varied, and of a highly interesting character. A prominent feature of the exhibition was the great display of Coleoptera, which comprised representatives of nearly all the British species. The groups Rhynchophora and Phytophaga were contained in Mr. E. A. Newbery's exhibit; while Mr. Cripps showed Geodephaga; and Mr. G. A. Lewcock, the genera *Necrophorus* and *Silpha*, and 32 species of Longicornia. Mr. Jarvis exhibited a typical collection of British Coleoptera and other entomological orders. Mr. Milton also exhibited Coleoptera, a case of dragonflies preserved in their natural colouring, also several species of Orthoptera. A wasp's nest,

obtained from Southgate by Mr. Battley, attracted much attention; as also did Mr. Bellamy's Asiatic Lepidoptera and Coleoptera, and Mr. R. W. Thompson's collection of butterflies from Alabama. Messrs. Cooke and Ashmead showed fine examples of Exotic Lepidoptera. Mr. Cooke also contributed a bred series of *Acronycta alni*, *Eugonia autumnaria*, and a specimen of *Noctua subrosea*. Mr. J. A. Clark's case contained some extraordinary varieties of *Triphæna comes*, *Asphalia flavicornis*, &c., from Scotland. Mr. G. Hollis exhibited examples of *Emydia cribrum*, *Drepana harpagula*, and a specimen of *Chærocampa nerii*, captured on London Bridge, in October, 1888. Dr. Sequiera's collection of insects taken in the New Forest last season, included *Argynnis paphia*, var. *valesina*, &c. Mr. O. C. Goldthwaite's case contained vars. of *Boarmia repandata*, nearly white, *B. rhomboidaria*, &c. Among the numerous varieties exhibited during the evening may be mentioned a black form of *Limenitis sibylla*, by Mr. H. Conquest; *Epinephela hyperanthes*, devoid of ocelli on upper wings, by Mr. C. Levett; *Cymatophora or*, by Mr. Mellor; and a large number of *Angerona prunaria*, by Messrs. Hockett, Mera, and Williams. The life-histories by Mr. Pearson were arranged with great care and neatness. Mr. G. Bryant's preserved larvæ of *Argynnis adippe* were also remarked in this department. Other exhibitors were Messrs. Gates and Boden, with Micro-Lepidoptera; Mr. Hawes, &c. Several drawers containing the Society's collections of Lepidoptera were also on view.—E. H. HAWES, 16, Raveley Street, N.W.; G. A. LEWCOCK, 73, Oxford Road, N., *Joint Hon. Secs.*

REVIEWS.

Monograph of the Sphingidæ of America, north of Mexico. By JOHN B. SMITH. American Entomological Society, Philadelphia. 1888.

WE find that Mr. Smith has treated eighty-three species as Sphingidæ, inhabiting temperate North America, sixteen being Macroglossinæ, eighteen Chærocampinæ, forty-one Sphinginæ, and eight Smerinthinæ. The work is very complete, including tables of genera and species, descriptions of the insects and, where known, also of the earlier stages, range of occurrence, notes on variation, bibliography, &c. In looking through the work one cannot help noting how little is known of the earlier stages of a large proportion of the American Sphingidæ, which is remarkable. Our "cousins" have the pleasure of discovery before them. There are ten plates illustrating this monograph, nine and a half being devoted to the illustration of the genital organs of various species, and the remainder to venation in certain genera. We have to congratulate the American Entomological Society upon issuing this monograph. Mr. Smith being so well known as an entomologist, and an authority upon the group, the work will remain long the standard of reference upon this subject.—J. T. C.

An Introduction to Entomology. By Professor JOHN HENRY COMSTOCK. Part I. Ithaca, New York. Published by the Author. 1888.

THIS part, which introduces what bids fair to be one of the most important books upon the subject of Entomology, contains—Thysanura, Mallophaga, Orthoptera, Neuroptera and Hemiptera. There is much originality in the work, which is profusely illustrated; many being from drawings by Mrs. Comstock, others having done duty elsewhere, but they are none the less useful now. We shall be interested to see the whole work on completion.—J. T. C.

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ON THE SYNONYMY OF *ACIDALIA HUMILIATA*, HUFN.

By JAS. W. TUTT, F.E.S.

I HAVE been much puzzled about the synonymy of one of our common Kent *Acidaliæ*, viz., the one that goes in different lists by the names of *osseata*, *dilutaria*, and *interjectaria*.

Wishing to form some sort of satisfactory conclusion as to which of these our species really was, I have worked up all the continental literature I can find on the subject, and have come to the conclusion that the name *ossearia*, Hb., had long been used in England; that owing to the absence in some of our specimens of a dark costal streak, and the position of the black central spot, this name was dropped and *dilutaria*, Hb., substituted; that Newman, for no very apparent reason,* dropped both these older names, and gave us Boisduval's comparatively new synonym—*interjectaria*.

The matter seems to resolve itself into the consideration of the two older names, *dilutaria* and *ossearia*. *Dilutaria* is figured by Hübner (fig. 100), *ossearia* also by Hübner (fig. 102), so that on the score of age both were produced together, although I suppose for our purpose fig. 100 must be considered older than fig. 102.

Turning to Hübner's fig. 100 (*dilutaria*), we find an insect about which, I must confess, I have considerable doubt. I have a long series before me, of some 60 or 70 of the species under question, and must own that among them I have not a specimen which I believe to be represented by Hübner's figure. My opinion is that *dilutaria* is a distinct continental species which we do not get. This opinion is borne out by the way that Dr. Staudinger treats the two figures of Hübner in the last edition of his 'Catalogue.' He retains the species represented by fig. 100 as

* The reason probably was that Boisduval treated the specimens with a brownish costa as specifically distinct.

distinct from that represented by fig. 102, and treats them in his list as two distinct definite species, fig. 100 being his *dilutaria*, fig. 102, *ossearia*, being a synonym of Hufnägel's *humiliata*. If, therefore, the two figures of Hübner represent distinct species, and I feel satisfied they do, the question is, To which is our species to be referred? I think I am right in believing it to be *ossearia*. Hübner's figure is characteristic of *many* bred and fine English specimens, the dark shade perhaps a little overdone, but otherwise the rounded character of the wings is clearly developed, and also the characteristic fine wavy lines. I once reared this species (about 1875), on knotgrass I believe,—but I am speaking from memory, and have no notes,—some with fine dark costæ, but some without, and I have frequently captured such specimens at Strood, Deal, and many other localities. Only those in the finest condition are thus marked, and not always then, for bred specimens are frequently without any special development of this shade; but I believe every one who has had a long and close acquaintance with the species would support me in this view.

With regard to the position of the black central dot in the anterior wings of our species, I may say that I have specimens in which it varies from being *on* the second streak to midway *between* the second and third streaks, others being intermediate between the two extremes, so that this is really no definite character at all.

As there seems very little doubt that our species is not the continental *dilutaria* at all, nor the *dilutaria* of Hübner, but that it is the *ossearia* of Hübner, which Dr. Staudinger is perfectly convinced is only a synonym of Hufnägel's *humiliata* (Hufn. Berl. M. iv. 614, date 1769); all our English-used names should drop out, and *humiliata*, Hufn., be substituted in its place, thus bringing us into unison with continental nomenclature.

The species should stand in our lists as—

Acidalia, Tr.

humiliata, Hufn.

osseata, Schiff. (S. V. p. 33, n. Cat.), Tr. (vi. 2, 32), Gn. (i. 467),
Mill. (Ic. 64-7), Dup. viii., Hb. 102.

interjectaria, B. (gen. p. 224). *dilutaria*, Hb. 100?

In the distribution of *humiliata*, Hufn. = *ossearia*, Hb., Staudinger gives Europe, *except* reg. bor., Sicily, Sardinia, Corsica, and Greece,—thus including England; while in the distribution of *dilutaria* he gives Central Europe, *except* Germany, S. Belgium, and England,—thus expressly excluding England.

If any entomologists should still consider that Hübner's figs. 100 and 102 (*dilutaria* and *ossearia*) really represent two forms of our species, both the names must sink as synonyms of Hufnägel's *humiliata*, for if one falls, the other—being of the same date—must sink with it.

It will be seen that I have altogether ignored Boisduval's and Guenée's name *interjectaria*, for after carefully studying their works I have come to the conclusion that Boisduval did not even make out a *primâ facie* reason for re-naming the insect. In his 'Index Lepidoptera Europæ' he gives the following synonymy for the two species :—

<i>osseata</i> , Hb., Dup.	} No. 1877, p. 224.	} A.D. 1840.	
<i>ossearia</i> , W. V., F., D.			
<i>interjectaria</i> , Boisd.	} No. 1879, p. 224.		
<i>dilutaria</i> , Hb.			

If he considered Hübner's *dilutaria* synonymous with his *interjectaria*, why did he re-name the species? And how can we possibly account for the fact that in his and Guenée's joint work, 'Naturelle des Insectes,' vol. ix., published seventeen years afterwards, they (or rather Guenée) make the distinction between *osseata* and his *interjectaria* to consist in the fact that while "*osseata* has a reddish shade along the costa, *interjectaria* has a brown one," when Hübner's *dilutaria* has no such shade? He (or Guenée) must have had *interjectaria* without a costal shade, otherwise the use of the synonym becomes inexplicable. I can recommend those interested in the matter to look up pp. 467, 468, of the above work. It will give them a good insight into what a French species is sometimes worth, and is an excellent characteristic of *un peu plus* and *un peu moins*, for which the descriptions of French entomologists have become celebrated. To explain what I mean, Boisduval and Guenée say of *osseata* :—"It is singular that neither the authors of the Vienna Catalogue nor English authors have mentioned as a salient character the red costa of this species. It is true that it is pale sometimes" (Guenée thus acknowledges that the character is inconstant), "but rarely so altogether; and for myself, I believe it necessary to drop all descriptions which omit this character, and to treat them as the next species, with which, at first sight, this species might easily be confounded." But of *interjectaria* they say :—"This is a species very close to *osseata*; one only distinguishes it at first by the costa, which is brown and not red, but besides this the colour is paler, more pallid and shining, the wings are more sinuous at the margins, &c." These are the salient points of their diagnoses of the two species, and, considering what we know of the species, I am certain there is not a point mentioned by them that is reliable. Our species sometimes has a decided reddish brown costa, sometimes brownish with scarcely a tinge of red. At other times it is quite free from any shade whatever, but there is every intermediate form, and these differences cannot constitute a specific difference. Again, there is a good deal of difference in the shape of the outer margin and apex of the

anterior wings, but this is common to many species in this and other genera.

One very pointed note is added by Boisduval to his description of *interjectaria* :—"Il a tout-a-fait raison lorsqu'il (M. Delaharpe), dit, qu'elle disparaît quand *osseata* commence." Our experience in England is quite against this, for we get the forms altogether. I have captured the species continuously from June 30th to August 12th, at Deal. I may add that Boisduval and Guenée, in their work mentioned, say of both these supposed species "larva unknown," so that the characters of the imagines were the only means of separation.

The first note as to *A. interjectaria* being a British insect is to be found from the pen of Mr. Doubleday (Entom. iii. 261), where he states that "having received specimens of *interjectaria* from Dr. Staudinger, he was convinced that specimens he had received from Cambridge belonged to this species, and that Guenée had identified them as such." This I quite agree with; there is not the remotest doubt that some of our specimens represent the *interjectaria* of Boisduval. We must remember, however, that our lepidopterists considered they were getting two species—*osseata* and *interjectaria*. The next note is from Mr. Howard Vaughan (Ent. Mo. Mag. iv. 91), where he announces the capture of the new species *interjectaria* at Plumstead, and telling us he did not distinguish them at the time from *osseata*, leaving us to assume that he did afterwards so distinguish them. The next note is from Dr. Knaggs (Ent. Mo. Mag. iv. 113), to the effect that *A. interjectaria* is tolerably abundant at Folkestone. He then points out differences between the Folkestone specimens, Cambridge *interjectaria*, and British *osseata*, and adds,—"No doubt the extremes of these two forms are distinct enough, but it is a confessedly difficult job to draw the line between them." Probably, considering that we have only one species in England, and have to split it up "to draw the line." This was followed by a note from Mr. Doubleday (Ent. Mo. Mag. iv. 161), who writes from Epping :—" *A. osseata* is rare here, and I only know of one spot where it occurs. Specimens taken a few years since, which were evidently very fresh, had the costa decidedly ferruginous, but this colour faded soon after they were dead. The ground colour of the wings was also yellower than in any specimens of *interjectaria*." These differences also referred, of course, to our one British species. This last extract was written in December, 1867, and was followed in February, 1868, by another note (Entom. iv. 30), where he writes :—"I have recently received from Dr. Staudinger several specimens of the true *Acidalia osseata*. I had not seen a continental specimen before. The typical examples have a bright red costa, and I have never seen any British specimens like them; but I possess

five or six which appear to be identical with a pale variety (of *osseata*), also sent to me by Dr. Staudinger. There is, however, no doubt that the majority of specimens in our cabinets under the name of *osseata* are really *interjectaria*." This I quite agree with; the majority are of that particular form. And here our greatest lepidopterist left it. I have in my own collection continental typical *osseata* with red costa, and pale varieties of the same species identical with ours. My specimen of the former is almost identical with a strongly-marked specimen I captured last year within a hundred yards of my own house. The Rev. H. Burney has a note (Entom. iv. 19), but I do not attach much importance to it, for the most strongly marked of our own specimens on the one hand, and the palest on the other, would make two tolerably distinct series; but this gentleman was the first to give us *dilutaria* as a synonym. I do not find, however, that he ever referred to the original figures or descriptions of Hübner, but based his note on the opinion of Dr. Staudinger as exemplified in the arrangement of the cabinet of Herr Kaltenbach. Neither Mr. Doubleday nor Dr. Knaggs appear to have referred to Hübner, but took for granted what Mons. Guenée or Dr. Staudinger considered correct. Yet this book is readily attainable. Dr. Staudinger, apparently soon after this, came to the conclusion that our species was specifically identical with *ossearia*, Hb. (*teste* his 'Catalog'). Hufnäger's work cannot be referred to by British lepidopterists, but so far as I have tested Dr. Staudinger's use of this author he has always been correct. In conclusion I would add that if anyone who has really long series from many different localities will compare their specimens with Hübner's figures, they will be satisfied that Hübner's *ossearia* is a strongly-marked form of our species, and that *interjectaria*, Bdv., has no *raison d'être*.

Westcombe Park, Blackheath, S.E.

ON THE VARIATION OF INSECTS.

By T. D. A. COCKERELL.

(Continued from p. 100.)

SUMMARY AND REMARKS ON COLOUR VARIETIES.

THE portions of this paper which have already appeared were written early in 1888, and hence some interesting facts more recently made known to me have yet no place in it. In any case, a subject of this kind cannot be in any sense finally treated,—at least not until our knowledge is incomparably greater than it is at the present day; and any writer who discusses variation must be prepared to consider every new fact or suggestion without

being unduly biassed by previous conceptions. The phenomena of colour variation are essentially of three distinct kinds:—

1. Due to a change in the nature or arrest in the metabolism of a pigment (chemical).
2. Due to a change of structure (physical).
3. Due to a change in the proportion of the normal colours.

The third of these is generally easy to distinguish; the first and second are easily confused, especially when descriptions only are accessible of the varieties under consideration. It will be useful to review these three classes:—

1. We have seen that red may be replaced by yellow, and more rarely yellow by red. A white pigment may also be changed to yellow, and, again, yellow is sometimes replaced by white (as in *Rumia*, see Entom. xxi. 15; and in *Heliodes arbuti albescens*, which has white in place of yellow on the secondaries, see Newman, 'Brit. Moths'). A caustic alkali will change the white of *Lycæna* to yellow, and a damp cyanide bottle will dye the yellow of *Colias* and of some Hymenoptera a deep red: these are chemical changes, presumably due to a change in the nature of the pigment. But alkali will not turn a white *Pieris* yellow; and, in fact, according to Dr. Dimmock, there is very little pigment at all in the white of a *Pieris*,—it is a sort of optical illusion, comparable to the white of finely-ground glass. So here at once is introduced a difficulty, which seems to throw such variations as *Pieris rapæ novangliæ*, *P. napi flava* (upper side entirely canary-yellow, C. G. Barrett, E. M. M., 1888, 81), and *Bryophila perla flavescens* into the third class instead of the first, and prove them to be caused by an enormous preponderance of that yellow pigment which is generally more or less visible about the typical forms. *Abraxas grossulariata lutea* I had already recognised (p. 2) as being of this nature. In the face of this evidence that changes from yellow to white and white to yellow, though apparently identical in their nature, really represent two radically different phenomena, one feels afraid of theorising about the other variations. Dimorphism of pigment, or dichroism, most certainly does exist, and is even frequent; but it is perfectly plain that to decide which varieties really belong to this class requires something more than a superficial examination. It is by the action of chemical reagents that we must test them. Pale forms, if due to a non-metabolism of pigment, will come properly under the first division; but it is possible that the green of *Venilia macularia viridimaculata* is really a deceiving combination of black and yellow, like the green of *Anthocharis*. Will anyone who has an example of this variety please examine it with a microscope, and report? Some suffused varieties, which one would naturally class under the third division, must belong to the first, because a damp cyanide bottle gives a suffused appearance to *Danaïs*

plexippus, and a similar variety occurs in nature (see 'Entomologica Americana,' vol. i. p. 159). A noteworthy form of dichroism, which must surely belong to the first division, is a change from blue to red or crimson, and *vice-versâ*. This occurs in *Catocala* (e. g., *Catocala nupta cærulescens*, with blue secondaries, as recorded in the 'Entomologist,' p. 51), and more frequently in the Locustidæ, as *Melanoplus atlantis cæruleipes*, Ckll.; *M. packardii rufipes*, with hind tibiæ red instead of blue (see 'Canadian Entomologist,' 1885, p. 18); *Caloptenus spretus cæruleipes*, with hind tibiæ blue instead of red (Can. Ent., 1878, 105). A similar dichroism appears in the secondaries of a European locust. It is worthy of remark that (so far as I know) each genus that presents this kind of dichroism also has species in which yellow takes the place of red or blue, and others in which the typical red varies to yellow, though in these species the red does not also vary to blue, nor do blue species seem to revert to yellow. Probably the yellow represents least, and the blue most, specialisation, as is said to be the case with the colours of flowers.

2. This is Hagen's class 1 (Ent. Mo. Mag. 1872, 78—83). I think it is almost certain that silver markings (as in *Argynnis*) are due to a change from white, but neither white nor silver are pigment. Dr. Dimmock (in 'Psyche') compares the white to ground-, and the silver to smooth-glass; and the comparison seems a particularly happy one. Probably such varieties as *Colias edusa purpurascens* belong to this division.

3. This, in which the proportions of the different colours are changed, includes a vast multitude of forms; and variation of this kind, instead of being comparatively rare, like those under 1 and 2, occurs in almost every species. My subdivisions "m," "n," "o," "p," afford good illustration of this variation.

Additions and References.

Glancing over the various subdivisions ("a" to "p"), I now give a few addenda and references to literature, which will be useful to those interested in the matter:—

(a.) 1. I have taken a variety of *Danaïs plexippus*, illustrating a condition opposite to that of the variety of *P. huntera*, quoted. This is described by Mr. Jenner Weir (Entom. 52). 2. See Scudder, on red varieties of the locustid *Amblycorypha* ('Psyche,' 1888, 69). I have not seen these varieties, and dare not theorise; but it is worth noting that some Locustids when put into alcohol turn red. 3. The American species of *Callimorpha* are divided into those with white and those with yellow secondaries (see Lyman, Can. Entom., 1887, 181). Probably the European red-winged species are more highly specialised than the American, and these occasionally revert to yellow. In the same way, the American form (*americana*) of *Chelonia caia* is probably nearer the primitive

type than ours, especially the var. *utahensis*, Hy. Edw., which has pale orange secondaries. *C. parthenos* is another nearly-allied form, which I find in Western Custer Co., Colorado, at 8400 feet alt. (I have to thank Mr. H. Strecker for the identification of this). 4. *Zygæna lavandulæ lutescens* has been found at Cannes (see Entom. xxi. 211). For another example of red and yellow forms, see G. M. Dodge on *Ædipoda corallipes* (Can. Ent., 1876, 101).

(e.) *Teras oxycoccana* is ash-grey, but the dimorphic form *malivorana* of Le Baron is orange. This dimorphism is without reference to food or sex. Similar phenomena occur in many British species, of which I have received full and interesting details through the kindness of Mr. J. W. Tutt. *Teras (Rhacodia) caudana* has two forms, which are neither sexual, seasonal, nor phytophagic. Mr. Tutt adds, "With regard to the other Tortrices it is a wide question; and when an extensive series is obtained I believe many dimorphic species become polymorphic, *i. e.*, I believe that the two extremes and generally better-known forms are connected by other intermediate forms. I hardly know whether polymorphic is at all a correct word to use in this case, as there are decidedly only two forms joined by intermediates." Of the British species of *Tortrix*, Mr. Tutt tells me that *xylosteara* and *ribeana* are polymorphic; *rosana*, *heparana*, *costana*, and *palleana* are dimorphic; *lafauriana*, *unifasciana*, *viburnana*, and *palleana* var. *icterana* are sexually dimorphic; *ministrana* has a melanic form of restricted occurrence; but the black form of *podana* is not restricted to any particular district, being taken in Notts, Yorks, Kent, Surrey, &c. In *Penthina*, says Mr. Tutt, "there is a strange case of dimorphism, certain forms losing their dark colours, and becoming white, with grey shades." Mr. Tutt has such a form of *P. variegana*. In the birds of the genus *Nyctidromus*, red and grey phases occur, the red being more prevalent in the tropics (see G. B. Sennett, 'The Auk,' 1888).

(f.) 1. Mr. W. H. Edwards, in Canad. Ent., 1876, 203, writes that *Lycæna comyntas* is "dimorphic in the female, most of this sex here (Coalburgh) being black, the others blue, with broad black margins. This phenomenon is similar to that of *pseudargiolus* in its winter form *violacea*." But the black *pseudargiolus* have since been found to be males, so perhaps the dimorphism of *comyntas* is also really in the male. I incline to consider that *Lycæna* presents an exception to the general rule, that in cases of sexual dimorphism in Lepidoptera it is the female that has varied from the original type; and this is why we find that almost unique phenomenon, a phase of dimorphism confined to the male. 2. To the cases of pale female Coliades, *C. christina* ♀ *pallida* (H. H. Lyman, Can. Ent., 1884, 6) and *C. alexandra* ♀ *pallida* (W. H. Edwards, Can. Ent., 1887, 229) may be added. The

frequency of these pale females varies exceedingly in the different species. In *C. scudderi* the yellow female seems to be an exception. In the seasonally dimorphic forms of *C. eurytheme* here, *pallida* is very common in the summer brood (*intermedia*), but I have never found it in the autumn and spring form (*autumnalis*). Nevertheless, a whitish form has been recorded for the var. *hagenii*, which is close to *autumnalis*. Mr. J. Anderson, jun., in his most interesting note (Entom. 72), shows that the *helice* female of *C. edusa* varies itself quite considerably, and he has even a buff-coloured variety of the female *edusa*, apparently intermediate between *helice* and the type.

(g.) 1. Aberrations, somewhat similar to that quoted in *Leucania conigera*, are recorded in *Chrysophanus phlæas* and *Papilio bianor* (see Ent. Mo. Mag., 1888, 278). 2. May I again entreat entomologists to look to the matter of asymmetry? C. H. T. Townsend, in Can. Ent., 1884, 238, says that the elytra of seven out of seventeen specimens of *Alaus oculatus* were unequal in length; of these seven, five had the left elytron shortest, these also being the cases in which the inequality was most prominent.

(h.) Additional cases of pseudohermaphroditism have been recorded in *Bupalus* and *Erebia* ('Psyche,' 1888, 92), in *Lycæna corydon* (Entom. xxi. 13), and in *Saturnia pavonia*; the last from Lincoln, recorded in 'Naturalist,' 1888, 199. The last sentence of section "h," "tokens that the female was once dimorphic," should read "female or male," as I think it was the male *Lycæna* that varied, and probably also the male *Anthocharis*, though we hear (Entom. 72) of a female *A. cardamines* with some of the orange of the male asymmetrically developed. This, however, is probably not an atavism, but a tendency on the part of one sex to adopt new peculiarities which have long been held by the other. It quite confirms the view that it is the male *Lycæna* that has varied, that Mr. W. H. Edwards records (Can. Ent., 1888, 160) an "hermaphrodite" of *Lycæna neglecta*, which on dissection proved to be a male. This observation is very important, and it is exceedingly desirable that it should be repeated with other pseudohermaphrodites.

(i.) Although one Chalcid presents a *pseudomas* form, another, *Pteromalus quadrimaculata*, has a var. of the male approaching the female in appearance, as recorded by Mr. Ashmead.

(k.) 1. On the small size of vernal broods (see C. V. Riley, 4th Report, U. S. Ent. Comm., 1885, 352). 2. On dark vernal forms of *Ips fasciatus* (see Dr. John Hamilton, Can. Ent., 1885, pp. 46, 47). 3. Compare the remarks (p. 29) on *Gonepteryx* with Darwin on *Fringilla cannabina* in England and Madeira ('Descent of Man,' p. 394).

(l.) 1. The dark *Colias*, mentioned on p. 55, is *C. meadii*,

Edw. Mr. W. H. Edwards has recently described the larva from specimens obtained from eggs laid by a female captured by Mr. W. S. Foster on Marshall Pass, Colorado. The larvæ are darker than those of any other *Colias* known to Mr. Edwards. 2. Recent observations and records have tended to confirm the view that melanism, or at least one form of it, is due to dampness. Conversely, pallid forms occur predominantly in the arid districts of Western North America, and I believe also in similar districts in Asia. With regard to the small mammal *Spermophilus tri-decemlineatus pallidus*, it "is the subspecies characteristic of the plains, and its pallid colour, like that of numerous mammals and birds of the same region (of Western N. America), is due to the aridness of the area which they inhabit" (Dr. C. H. Merriam, *in litt.* to H. G. Smith, jun.).

For the present paper, this shall suffice for colour-variation. It now remains to treat of varieties of shape and size, and of certain other matters, such as hybridism.

ERRATA.—P. 4, line 9* from bottom, for "*typica*" read "*chrysographia*, Hb." P. 6, line 25 from bottom, for "formally" read "formerly." P. 55, line 11 from top, for "*obscura*" read "*salicis*, Staint." P. 55, line 13 from top, for "*nigrescens*" read "*infuscata*, White."

(To be continued.)

LIST OF THE BRITISH STRATIOMYIDÆ, WITH ANALYTICAL TABLES AND NOTES.

By E. BRUNETTI.

(Concluded from p. 86.)

6. ODONTOMYIA, Mg. (1804), Klass. i. 128.

= STRATIOMYS, p. Zett.

- | | |
|---|---------------------------|
| A. First antennal joint twice as long as 2nd. | |
| B. Abdomen with whitish pubescence | - - - - <i>argentata.</i> |
| BB. Pubescence absent. | - - - - <i>microleon.</i> |
| AA. First antennal joint as long as 2nd. | |
| C. Abdomen all black | - - - - <i>tigrina.</i> |
| CC. Abdomen yellow or green, marked with black | |
| D. With 3 pairs of distinct spots | - - - - <i>ornata.</i> |
| DD. Yellow or green, with black dorsal stripe; no distinct spots. | |
| E. First vein from the discoidal cell rudimentary, 3rd complete | <i>viridula.</i> |
| EE. First vein complete, 3rd rudimentary. | |
| F. Black abdominal band narrower on 1st segment than the others. | <i>hydropota.</i> |
| FF. Black abdominal band of equal width on all segments. | <i>angulata.</i> |

1. *O. microleon*, L. (1761), F. Suec. ii. 1781. — Four distinct species have come under my notice as "*microleon*." One in the Entomological Club collection was *O. ornata* var.; one in

the Banksian collection was far too small to be this species, and was too dilapidated to identify; one in Dr. Mason's collection which, though I fail to recognise it, is certainly not this species; and one in Dr. Meade's cabinet, this latter being the only specimen I can safely refer to this species. I found one in the British Museum general collection under the genus *Oxycera*. Very rare. I have one from Austria.

2. *O. argentata*, F. (1794), Ent. Sys. iv. 266. = *paludosa*, Schum.—The under side of the abdomen of this species is said to be green, but I have not noticed this fact, it may, however be the case in living specimens; I know the green colour of *O. viridula* often fades after death. Not uncommon. On willows. Generally distributed.

3. *O. ornata*, Mg. (1804), Klass. i. 129. = *furcata*, Latr.; *transformations*, Reaumur Mem. iv. pl. xxv. — The British Museum collection contains an interesting variety, in which the markings on the face differ from those in the type. Prof. Jænnicke has bred this species from aquatic larva. Rather common, and generally distributed.

4. *O. tigrina*, F. (1781), Sp. Ins. i. 417. = *nigrita*, Fall.—Not common. Easily recognised by its entirely black colour.

5. *O. angulata*, Panz. (1798), F. Germ. lviii. 19. = *ruficornis*, Zett.; *brevicornis*, Lw.—Mr. Verrall introduced it to our fauna in the Ent. Month. Mag. for Jan., 1886, having taken one female at Tuddenham in July. Mr. Dale has it also in his collection from the south-west. Allied to *hydropota*, Mg. Very rare.

6. *O. hydropota*, Mg. (1822), Sys. Bes. iii. 147.—This species I considered "uncertain" for a long time, but among some specimens from his collection very kindly lent me by Mr. C. Dale for examination, I found a specimen undoubtedly of this species. I have it from France and Bohemia, it being rather common on the Continent. Very possibly it is now quite extinct in Britain.

7. *O. viridula*, F. (1775), Sys. Ent. 760. = *canina*, Pz.; *jejuna*, Schr.; *dentata*, *subvittata*, *bimaculata*, Mg.; *interrupta*, Lw.—The variety *subvittata*, Mg., is so pronounced that, but for Schiner and Jænnicke ranking it as such, I should have regarded it as specifically distinct. It is entirely yellowish, with an irregular narrow black central stripe on the abdomen. Dr. Mason's collection contains some extraordinary varieties of this common and widely distributed species.

Walker introduced *O. connexa* as British, giving no locality, but mentioning its rarity and presence in the British Museum. In the corrections in vol. iii. of his Ins. Brit., he admits that it is not even European, and that it was inserted by mistake. What I believe to be his type specimen is still in the British Museum British collection. He also introduces *O. hydrodromia*, Mg., and *O. hydroleon*, Mg.; but of neither of these species can I find

any specimen. *O. hydroleon* having pubescent eyes, would fall in Rondani's genus *Psellidotus*.

7. SARGUS, F. (1798), Ent. Sys. Supp. 566.
= NEMOTELUS, DeG.; MUSCA, L.

Walker and Curtis both describe this genus as being destitute of palpi, but these organs (though small) are present.

Brown suffusion around stigma	-	-	-	-	<i>cuprarius</i> .
No suffusion.					
Wings almost clear.	-	-	-	-	<i>flavipes</i> .
Wings uniformly pale brown	-	-	-	-	<i>infuscatus</i> .

1. *S. cuprarius*, L. (1761), F. Suec. 1853. = *violaceus*, Scop.; *cæruleicollis*, Mg.; *nubeculosus*, Zett.; *larva*, De G. Ins. vi. pl. xii.—Zetterstedt's *nubeculosus* was ranked by Walker and Schiner as distinct, the former suggesting that it was a variety of this species. Zetterstedt made its inferior size the principal distinction, but I have seen specimens showing every grade in size. Van der Wulp, the latest authority on this family, also ranks it as a var. of *cuprarius*. Common everywhere; London included.

2. *S. infuscatus*, Mg. (1822), Sys. Bes. iii. 107. = *cuprarius*, Linne's Coll.; *indicus*, Harr.; *auratus*, Mg.; *iridatus*, Walk.—Common, and widely distributed. Easily recognised by the uniformly brown wings. Taken occasionally in and about London.

3. *S. flavipes*, Mg. (1822), Sys. Bes. iii. 108, pl. xxv. 14.—Zetterstedt mentions that the femora in the male are black. It is important to know this, as it affords an easy method of distinguishing it from the male of *C. bipunctatus*, in which species the legs are entirely tawny-yellow in both sexes. Rather uncommon, though Walker describes it with his customary and monotonous, "generally distributed." *S. nitidus*, Mg., was introduced as British by Curtis, but I can find no specimens belonging to this species.

8. CHRYSONOTUS, Lw. (1855), Verh. Zoo. Bot. Ges. v. 131.
= SARGUS, Walk., Curt.; MUSCA, Scop.

1. *C. bipunctatus*, Scop. (1763), Ent. Carn. 341. = *Reaumur*, F.; *transformations*, Reaumur, Mem. iv., Pl. xiii., xiv., xxii.—Uncommon, almost rare. It has occurred in Yorkshire, Kent, and other well-separated localities. Curtis' figure of the antenna is incorrect.

9. CHLOROMYIA, Dunc. (1837), Mag. Zoo. Bot. (1837).
= MUSCA, L.; NEMOTELUS, De G.; SARGUS, F.; CHRYSOMYIA, Walk., Schin.; CHLORISOMA, CHLOROSIA, Rond.

Prof. Van der Wulp, in his 'Diptera Neerlandica,' retains the old generic name, *Chrysomyia*, for this species, and includes in the same genus both species of *Microchrysa*. I am rather doubtful of the right of *Chrysonotus* to generic rank, but *Chloromyia* and *Microchrysa* seem quite distinct.

1. *C. formosa*, Scop. (1763), Ent. Carn. 339-910. = *auratus*, F.; *flavogeniculatus*, De G.; *cuprarius*, Scop.; *cicur*, Harr.; *xanthoptera*, Mg.; *azureus*, Lw.—Very common everywhere; London included. The list of synonyms will show how variable the species is, though when once well recognised it cannot be mistaken for any other species in the whole order.

10. MICROCHRYSA, Lw. (1855), Verh. Zoo. Bot. Ges. v. 131.

= CHRYSOMYIA, Walk.; SARGUS, F.; NEMOTELUS, De G.; MUSCA, L.

Antennæ black.	-	-	-	<i>polita</i> .
Antennæ tawny.	-	-	-	<i>flavicornis</i> .

1. *M. polita*, Linn. (1761), F. Suec. (1854). = *aurata*, De G.; *cyaneus*, F.; *splendens*, Mg.; *vitreus*, Harr.—In one variety of this common and widely-distributed species, all the tibiæ are tawny-yellow in both sexes.

2. *M. flavicornis*, Mg. (1822), Sys. Bes. iii. 112. = *parvulus*, Harr.; *pallipes*, *cyaneiventris*, Zett.; *politus*, Fall.—Dr. Meade's collection contains one specimen of the very distinct variety *cyaneiventris*, taken near Bradford. The type and the var. *pallipes* are common everywhere, both this and the last species occurring also in London.

11. BERIS, Latr. (1802), Hist. Nat. d'Ins. xiv. 340.

= STRATIOMYS, F.; MUSCA, L.; ACTINA, Mg.

- A. Abdomen all tawny yellow.
- B. Transverse abdominal furrows near apex of each segment. *clavipes*.
- BB. Furrows hardly visible, or absent. - - - - - *vallata*.
- AA. Abdomen violet or bluish black.
- C. Wings all brown; legs chiefly black or brown.
- D. Legs light brown; hind metatarsus very thick, not longer than the rest of the tarsus. - - - - - *chalybeata*, ♂.
- DD. Legs dark brown, knees lighter; hind metatarsus not thickened, longer than the rest of the tarsus. - - - - - *fuscipes*, ♂.
- CC. Wings yellowish grey, a large brownish black stigma; legs chiefly yellow.
- E. Eyes on vertex separated by one-third of the width of the head.
- F. Hind metatarsus much longer than the four other tarsal joints together. Brown band towards tip of posterior femora. *fuscipes*, ♀.
- FF. Hind metatarsus as long or hardly longer than the four other tarsal joints taken together. Posterior femora unmarked. *chalybeata*, ♀.
- EE. Eyes on vertex contiguous or parted by only one-fifth of the width of the head. - - - - - *morrisii*, ♂, ♀.

There are only five European species of *Beris*, all of which inhabit Great Britain.

1. *B. clavipes*, Linn. (1767), Sys. Nat. ii. 981. = *nigra*, Geoff.—Common. The female has dark wings.

2. *B. vallata*, Forst. (1771), Nov. sp. Ins. Cent. i. 96. = *nigritarsis*, Lat.; *clavipes*, Mg.—It is almost impossible to distinguish the males of this species from those of *clavipes*. The transverse

furrows on the abdomen are usually more distinct in *clavipes*. The female has light wings. Common.

3. *B. chalybeata*, Forst. (1771), *l. c.* 95. = *sexdentata*, Mg.; *flavipes*, Mcq.; *obscura*, Zett.; *atra*, Mg.—This species has been bred from pupæ found in moss. Variable, common.

4. *B. fuscipes*, Mg. (1820), *Sys. Bes. ii.* 8. = *geniculata*, Curt.—Uncommon; but not “rare,” as Walker states. South coast. The *geniculata* var. of Curtis comes from Ireland.

5. *B. morrisii*, Dale (1842), *Entom.* (1842), p. 115. = *pallipes*, Iiv.—Uncommon. South Coast.

12. ACTINA, Mg.

= CHLORISOPS, Rond.

1. *A. tibialis*, Mg. (1820), *Sys. Bes. ii.* 3.—Variable, rather common. Found in woods. The other European species, *A. nitens*, has been recorded as British, but does not appear to have any claim to a place in our lists.

Being at present engaged on a revision of the British *Asilidæ* and *Conopidæ*, I should esteem it a favour if anyone having collections of these groups would kindly allow me to examine them.

My best thanks are due to Mr. Verrall, Dr. Meade, Dr. Mason, and Mr. Dale, for allowing me examination, in whole or in part, of their collections, and for most useful information; also to Mr. B. Lowne, for affording me an opportunity of inspecting the Entomological Club Collection.

129, Grosvenor Park, Camberwell, S.E.

CONTRIBUTIONS TOWARDS A LIST OF THE VARIETIES OF NOCTUÆ OCCURRING IN THE BRITISH ISLANDS.

By J. W. TUTT, F.E.S.

(Continued from p. 98.)

Neuria, Gn., *reticulata*, Vill.

The type of this species is described in De Villers' ‘*Caroli Linnæi Entomologia Fauna Suecicæ*,’ &c., ii. p. 254, as follows:—“*Phalæna Noctua* (le réticulée) spirilinguis, thorace cristato-angularie, alis deflexis fuscis, rivulis reticulatis griseis. Alæ superiores brunneæ, lineis strigisque griseis quasi reticulatæ; in medio prope marginem exteriorem, macula grisea ovaliformi duplicique circulo. Alæ inferiores infra et supra griseæ.”

This is one of our most constant species in Britain. In the series I have, the only noticeable point of variation is in the shape and direction of the stigmata (orbicular and reniform); but it

does not appear to be so invariable, in the ground colour at least, on the Continent. Hübner, under the name of *typica*, figures a rich purple-brown variety; while Guenée says of the French specimens, "The two median lines geminated, tinted with rose-colour" ('Noctuelles,' vol. v. p. 167). Probably these brightly-coloured forms exist in collections in Britain. Mr. N. F. Dobrée writes:—" *N. reticulata* is so scarce in this part of the E. Riding (Beverley) that I have never taken more than two; but these still retain a decided vinous tinge, though taken five years ago" (*in litt.*). Our ordinary British form was described by Haworth, under the name of *marginosa* ('Lepidoptera Britannica,' p. 195, No. 101).

α. var. typica, Hb.—Hübner figures (58) the type of this variety, of which I made the following description:—"Anterior wings of a rich purplish brown, with the longitudinal nervures nearly absent, otherwise much like our own specimens; the three pale transverse lines and stigmata outlined in pinkish grey. Hind wings grey, hind margin darker, with three white dots in centre of extreme outer margin; a distinct transverse line and lunule."

β. var. unicolor, Stdgr.—This variety is mentioned by Staudinger in his trade list, and in answer to a query Mr. Dobrée has written:—"The var. *unicolor* derives its name from being a uniform brown-grey, the nervures and markings being pricked out in a lighter shade of the ground colour. My specimens are from Kaschgar, in Russian Turkestan" (*in litt.*).

Neuronia, Hb., *popularis*, Fab.

This species was described more than once by Fabricius. His description, taken from the 'Entomologia systematica emendata et aucta,' &c., p. 484, No. 240, is as follows:—"Bombyx* alis incumbenibus fuscis albo venosis posticis albidis. Statura præcedentis (*graminis*). Antennæ pectinatæ, fuscæ. Alæ anticæ fuscæ venis albis. In medio maculæ ordinariæ pupilla obscuriore. Versus apicem striga e maculis parvis, sagittatis, atris. Posticæ albidæ margine obscuriore subtusque puncto centrali, fusco." Haworth, in the 'Lepidoptera Britannica,' p. 117, describes the species under the name of *popularius*; whilst Hübner figures a form tinged with pink under the name of *graminis*.

The variation of this species appears to be confined within very narrow limits. In some specimens the orbicular is large, and formed of a dark centre surrounded by white or ochreous, in others it is a pale spot, while in others it is almost obsolete; the reniform also varies in colour and size. The transverse lines are sometimes white, sometimes ochreous, sometimes tinged with pink, as in Hübner's *graminis*. There is also a considerable

* It must be borne in mind that the early lepidopterists classed all our *Noctuæ* with pectinated antennæ as Bombyces.

amount of difference in the intensity of the dark grey border to the hind wings of the males. In some it may be described as black, so intense is it; while in other specimens there is every grade of intensity to an almost total absence. In both sexes there is a great deal of difference in the development of the dark wedge-shaped marks parallel to the hind margin, but the males vary most in this respect. There is a good deal of sexual difference, the males being, as a rule, much smaller than the females. Mr. Dobrée writes:—"In a male I have from Central Russia, the ground colour is slate-grey" (*in litt.*).

Var. *graminis*, Hb.—Hübner's fig. 59 has "all the pale longitudinal and transverse markings with a distinct pinkish tinge, hind wings also pinkish." The markings are as in our British specimens, the only difference being that of colour, although our British specimens often have the nervures tinged with pink.

Heliophobus, Bdv., *hispida*, Hb.-Gey.

Geyer's figures 784-86, in his Supplement to Hübner's 'Schmetterlinge,' &c., represent the type of this species. His figure 784 may be described as, "Anterior wings purplish brown, with all the pale markings of a delicate violet, except along the inner margin, where they are yellow. Antennæ pectinated. Hind wings grey, darker on the hind margin, with a dark line parallel to the hind margin." His figure 785 is the under side of the male represented in fig. 784; while fig. 786 is a female, having "the anterior wings dark reddish brown, with all the pale transverse lines ochreous, and nervures white." I believe the *oditis* of Hübner (fig. 694) is only a small *hispida* ♀. It would appear that the continental specimens of this species are, in general, more violet than our British specimens, for in the 'Noctuelles,' vol. v. p. 172, Guenée, describing his var. A, says, "less violet," thus leaving us to assume that their type, which he refers to Hübner's fig. 784, is violet-coloured. For this type he gives as a locality, "Provence." Regarding these violet-tinged *hispida* in England, in answer to a query from me, Mr. Nelson M. Richardson, M.A., writing from Weymouth, says:—"I cannot see anything worth calling a violet tinge on any of my specimens: there is an approach to a violet tinge on the transverse line just beyond the reniform, but I should not mention it in a description as such, as it is scarcely violet, but rather steel-grey." I have received specimens from Mr. Richardson and Major Partridge, captured at Portland last year (1888), and I have a number of specimens from Torquay, but none of these show the typical violet coloration. It is remarkable that the specimens from Portland have a much clearer white ground colour* than those

* This is worthy of notice, as the same difference exists in specimens of *E. lichenea* from these localities.

from Torquay,—the hind margin of the anterior wings with a broad silvery band; while those from the latter place have only a fine line, and the hind wings of the former are so white that they present a very different appearance to Torquay specimens. The latter, indeed, appear to be Hübner's *oditis*. Among our ordinary British specimens we appear to have four (at least) distinct forms:—

1. A dark brown form, with deep ochreous stigmata, and dark ochreous grey hind wings in both sexes, = var. *suffusa*.

2. A dark brown form, with silvery white markings, white band on hind margin, hind wings comparatively pale, = var. *argentea*.

3. A pale brownish grey form, with white markings and white hind wings, = var. *pallida*.

4. An obsolete form, with no markings whatever between the reniform and outer margin, = var. *obsoleta*.

α. var. intermedia, mihi.—An intermediate form, described by Guenée as var. *A*, which serves to connect Hübner's violet type with our British specimens which are without such a tint. It is described in his 'Noctuelles,' vol. v. p. 172, as "Generally paler, more yellow, less violet, with the lines and stigmata more decided of a clearer white. The inferior wings clearer. Locality, West of France." If Guenée did not leave us to suppose that this variety was violet-tinged, I should certainly suppose it was the same as the ordinary Portland specimens.

β. var. suffusa, mihi.—Ground colour dark brown, with the stigmata of deep ochreous colour, the transverse lines and nervures of a whitish ochreous in the males, yellow ochreous in the females, a fine line bordering the hind margin; fringes grey. Hind wings grey in both sexes, with a very dark outer margin, and a dark transverse line; fringes grey. 'This is by far the most suffused form I have seen. My specimens came from Torquay.'

γ. var. argentea, mihi.—Ground colour dark brown, with longitudinal nervures and basal transverse lines white; orbicular and reniform white, with a faint yellow tinge; a transverse grey (almost steel-grey) band beyond the reniform, and a broad white line parallel to the hind margin. Hind wings white, with a broken grey hind marginal band, and a grey transverse line; fringes white. The ground colour of the females is darker. My specimens came from Portland.

δ. var. pallida, mihi.—Ground colour grey, very pale, with a slight brownish tinge; costa very pale, whitish ochreous; a broad white line at hind margin; fringes white. Hind wings white, with scarcely a trace of the grey marginal border, and only the basal part of the grey transverse line; fringes white. This is an extreme form of var. *argentea*. Of this variety, Mr. Nelson Richardson writes, "This is a more common var., and very pretty, . . . I think the pale *hispidus* is the prettiest form of the species" (*in litt.*). My specimens came from Portland.

ε. var. obsoleta, mihi.—A very peculiar form of the insect. Ground colour dull grey, with very few pale markings; a pale abbreviated transverse basal line, a complete one just before the orbicular, a bifurcate transverse median line, extending under orbicular to the reniform and the central part of the basal nervures, are the only pale markings, besides the

orbicular, reniform, and a line parallel to hind margin. There is scarcely a trace of the ordinary pale markings between the reniform area and hind margin. Hind wings as in var. *argentea*. This appears to be a rare variety, for Mr. Richardson writes, "This does not seem to be a common var., as I have only seen one or two others with so little in the way of light markings" (*in litt.*). I have only Portland specimens.

♂. var. *oditis*, Hb. ?—I am not certain that Hübner's figs. 694 and 695, *oditis*, really represent a variety of *hispidus*, but I firmly believe it is the same as my var. *suffusa*. If Hübner's *oditis* really is this species, the name would take priority of Geyer's *hispidus*. My description of *oditis* is as follows:— "♀. Looks like a small *hispidus*. Anterior wings brown, all nervures transverse lines and stigmata yellow-ochreous. Hind wings grey, darker on margin, a dark line parallel to hind margin, and dark lunule." Fig. 695 is the under side of fig. 694. Guenée, referring to *oditis*, says ('Noctuelles,' vol. v. p. 172), "I have not seen it, and know no one who possesses it."

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

GENERAL INDEX TO THE 'ENTOMOLOGIST.'—The proposal that Mr. Newman should publish, by subscription, a General Index to all the volumes of the 'Entomologist' issued (*vide* Entom. 78), has, we are pleased to say, been favourably received, and a large number who wish to take copies have already sent in their names. There still, however, remains a deficit, and it is most desirable that all those who intend to subscribe, but who have not, should do so as early as possible, so that the work may be proceeded with. We would remind our readers that this work will really constitute a *resumé* of Entomology for the past quarter century, and will form a large-sized volume, uniform with the series of the 'Entomologist.'—ED.

PIERIS BRASSICÆ WITH VEINS OF WINGS GREEN.—Chance has satisfied me that more importance has been given to this than the subject deserves. In Dr. Gill's cabinet there was a male specimen of this butterfly, with all the veins broadly green from the margins to the centre of the wings; and in Mr. Gregson's another, also a male, in which the same appears, but not quite so strikingly. In each of these insects blotches of colour at the end of some of the veins show that there has been a rupture, and that the cause came from the margins, not from moisture from the body of the butterfly. Last year I netted several *brassicæ* for practice in setting by my children. Individuals of these, pinned in a damp box, were neglected for some little time. When taken out, behold similar specimens to the above examples! the veins green, and ruptured identically the same as these so-called varieties. An experiment, made in consequence, proved that these could, at pleasure, be produced, provided the insect to be acted upon had been but a short time from the pupa.—SIDNEY WEBB; Maidstone House, Dover, April 3, 1889.

FOOD-PLANT OF HESPERIA ACTÆON.—In the E. M. M., vol x., p. 86, the late Mr. Wm. Buckler described the food-plant of the larva of *Hesperia actæon* as *Brachypodium sylvaticum*, and as I find this statement is not corrected in 'Buckler's Larvæ,' published by the Ray Society, it may be

well to publish Mr. W. Buckler's own correction of this error. The following is an extract from a letter received by myself from Mr. Buckler, dated, Emsworth, June 7th, 1880:—"I am indeed greatly rejoiced to see the larvæ of *H. actæon* in all stages of growth that you have so kindly sent me, and particularly at the blossom of the grass they feed on, for I can now be sure it is that of *Brachypodium pinnatum*, and not *sylvaticum*." I may add that *B. sylvaticum*, so far as I am aware, does not grow in the localities frequented by *H. actæon*, while *B. pinnatum* is abundant.—(Rev.) C. R. DIGBY; Studland Rectory, Wareham, April 1st, 1889.

AGLIA TAU.—The preconception I entertained with respect to *Aglia tau* was that it haunted the shade of forest glades and clearings, where the caterpillar bred recluse on the tall and lofty trees; Mr. Kirby specifies the beech, lime, and oak. I encountered it, however, under different circumstances on a shrubby slope above the village of Olewig, near Treves, where I mistook it for a large unknown *Argynnis* butterfly; and later on I found the eggs laid on a low bush, resembling in aspect our English sloe, but with pointed leaves and otherwise different; a common shrub on the bleaker exposures of the heights that command the valley of the Moselle.—A. H. SWINTON; Tudor Villas, Bedford.

FOOD OF NYSSIA ZONARIA.—Noticing Mr. Milton's remarks (Entom. 113) that he had fed the larvæ of *Nyssia zonaria* on yarrow, I may mention that I have on two or three occasions (some few years since) reared the larvæ on yarrow. I think Mr. Arkle must have overlooked Stainton, Newman, and Merrin's Calendar, or he would have seen they all give yarrow as the food-plant.—JNO. HARRISON; 7, Gawber Road, Barnsley, April 8, 1889.

FOOD OF EPUNDA LICHENEÆ.—On the 8th instant I found a dozen larvæ of *Epunda licheneæ* feeding on *Linaria cymbalaria* in a greenhouse, where the ivy-leaved snap-dragon was permitted to grow and trail on the shelves. My attention was first drawn to it by seeing so many of the long slender leaf-stems standing erect, minus the leaves, which had been consumed by the larvæ. I think this is worth noting, as it is a plant not hitherto recorded as its food-plant.—G. C. BIGNELL; 7, Clarence Place, Stonehouse, Devon, April 11, 1889.

OXYPTILUS TEUCRII.—In his remarks on the Pterophori, Mr. South still seems to overlook that the only way in which we could at present accept Haworth's name, *heterodactylus*, for this species, is by deliberately ignoring the law of priority, and accepting Haworth as the originator of the name, passing over De Villers altogether. At present we have no evidence at all of the identity of Haworth's *heterodactylus* with De Villers' *heterodactylus*, or that Haworth ever saw a single specimen, or even drawing, of the latter. Neither do we know at all what species De Villers' *heterodactylus* was. His description, "Alis patentibus fassis, nigris, maculis albis," is so vague, that it might equally well apply to several of the genus. The fact that Mr. Stephens, in his second and larger work in 1834, omitted the reference to Haworth, which he had inserted in his previous work in 1829, would rather lead us to suppose that he was in some doubt as to the synonymy. Mr. South's argument, elsewhere, that we should adopt the name from Haworth's specimen, because it *may* be identical with De Villers' species, is wholly unscientific. The burden of proof clearly lies on those

who wish to change a name like *teucriti*, which every British entomologist knows and understands, for a name which, to say the least of it, is utterly forgotten, is very questionable; and if adopted on the grounds brought forward may at any time have to be changed again if a named specimen of any other entomologist, British or continental, subsequent to De Villers, turned up, for there is no reason why Haworth's opinion alone should be accepted as final.—C. A. BRIGGS; 55, Lincoln's Inn Fields, April 15, 1889.

BUTALIS LAMINELLA IN KENT.—On looking through my series of *Butalis fuscocuprella* recently, I found four specimens of *B. laminella* among specimens captured at Cuxton in Kent. It will be remembered that this species was recently added to the British fauna by Mr. W. H. B. Fletcher.—J. W. TUTT.

SIREX IN NORTH WALES.—A year or two ago I caught a fine female specimen of *Sirex gigas* flying round a juniper in the garden. They are not uncommon round here, and several trees have been injured by the larvæ.—HILDA G. NAYLOR; Brynllwarch Hall, Kerry, Montgomeryshire.

DESTRUCTION BY ANOBIUM PANICEUM, L.—During March last I discovered in my warehouse quite a colony of beetles, which had taken up their quarters in a box containing packets of Dr. Jenner's Food for Infants. The packets were completely riddled through and through, and the sides of the wooden box were grooved out, as if done with a very small chisel and auger, where the larvæ of the beetles had made their galleries. Both larvæ and beetles could be seen in hundreds; in fact all stages of the insect were present. Not being acquainted with its name, I sent a few by post to Mr. G. A. Lewcock, who kindly replied as follows:—"The beetles you sent are named *Anobium paniceum*, generally a very destructive species in its habits, particularly when allowed to remain undisturbed for some time in one habitat, as it breeds rapidly, and does not confine itself to any one class of goods. Very few articles of produce seem to come amiss as food, for I have seen drawers of whole ginger literally crowded with the beetles; and I have no doubt that Dr. Jenner's Food is admirably suited to the requirements of the larvæ, as instanced by your fine specimens."—J. A. CLARK; 48, The Broadway, London Fields, N.E.

THE COLD SUMMER OF 1888, AND DOUBLE-BROODED MOTHS.—It seems probable that the cold summer of last year will have left its mark on many of the insects which will emerge this year, and especially on the double-brooded moths, such as species of the genus *Selenia*; and it would be interesting to know whether the experience of collectors in any way bears this out. To my knowledge, species that would in ordinary seasons have been all double-brooded, had but a single brood in some cases last year; and when there was a double brood the larvæ of the second one suffered greatly in cases which fell under my observation, in numbers, vigour, and size, from the adverse influences to which they were exposed. Those *Selenia* I have bred—all of which proceed from the second brood—have been comparatively few in number, small in size, and with a large proportion of deformities. I am inclined to think that few of the second brood will have survived, and that what moths are taken this year will mostly be the immediate offspring of parents which laid their eggs last spring. They ought, therefore,—unless from other causes, which may be

at work,—not to be very abundant. I think there is no reason to expect those which have taken a whole year over their transformation to be very different in appearance from the ordinary spring examples.—F. MERRIFIELD; 24, Vernon Terrace, Brighton.

EXTRACTION OF MOTHS FROM PUPA.—With further reference to notes on this subject (Entom. xxi. 236, and xxii. 50, 76), permit me to say that I came in February, 1888, from South Carolina, U.S.A., and brought with me a large number of pupæ, among which were some *Papilios*, *Sphinges*, and *Bombyces*. These I placed in a cool greenhouse, and carefully looked after them; but several, apparently being ready to emerge, shrivelled and died. I finally decided to break the cases of those which laboured to emerge, and succeeded on several occasions; the wings expanded quite naturally, although some, I must add, failed to do so. I believe that if the attempt to assist the insect be made at the opportune moment it will most likely prove successful; but I think that the reverse will occur if the operation be either too early or too late.—J. P. GREGOE; Tredinick, Bodmin, February 15, 1889.

INSECTS AT HIGH ALTITUDES.—I am just now accumulating material for an account of the insect-fauna above 10,000 feet altitude on the E. slope of the Sangre de Cristo range; and, while doing so, I find I have notes of nine species taken above 10,000 feet in other parts of Colorado, which I may as well put on record, as insects from these high altitudes are always interesting to compare with those of the Palæartic regions. *Pachyta liturata*, Kirby, Leadville (10,200 feet), August 18th, 1887; *Buprestis maculiventris*, Say, and *Melanophila longipes*, Say, Pottery Pass (between Wheeler and Red Cliff), 1887; *Sirex flavicornis*, Fab., Leadville, August 18th, 1887; *Parnassius smintheus*, Dbl. & Hew., near Gibb's Peak, Sagnache Co. (over 11,000 feet), 1887; *Satyrus charon*, Edw., and *Lycæna rustica*, Edw., Fremont Pass, Lake Co. (over 11,000 feet), 1887; *Agrotis rubefactalis*, Grote, Fremont Pass, Lake Co.; *Camnula atrox*, Scudd., Leadville and Fremont Pass. For the identification of these (except the *Parnassius*) I am indebted to Mr. Hy. Edwards, Dr. John Hamilton, and the U. S. National Museum.—T. D. A. COCKERELL; West Cliff, Custer Co., Colorado, U.S.A., February 25, 1889.

REARING LARVÆ IN GLASS-CYLINDERS.—Can any of your correspondents refer me either to the 'Entomologist' or elsewhere for information as to rearing larvæ in glass-cylinders?—A. N. CHAMBERLAIN; Highbury, Moor Green, Birmingham, April 22, 1889.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—April 3rd, 1889.—Mr. F. Du Cane-Godman, M.A., F.R.S., Vice-President, in the chair. Mr. A. Cant, of 93, Robert Street, Regent's Park, N.W.; Mr. C. Cave, of 13, Lowndes Square, S.W.; Mr. N. F. Dobrée, of The New Walk, Beverley; Mr. J. Harrison, of Gawber Road, Barnsley; Mr. S. L. Mosley, of Beaumont Park, Huddersfield; and Mr. B. G. Nevinson, M.A., F.Z.S., of 6, Tite Street, Chelsea, S.W., were elected Fellows. Mr. Osbert Salvin

exhibited specimens of *Ornithoptera trojana*, Staud., and *O. plateni*, Staud., received from Dr. Staudinger, and obtained in Palawan, an island between Borneo and the Philippines. He remarked that *Ornithoptera trojana* was allied to *O. brookiana*, Wall. Mr. R. M'Lachlan exhibited, and made remarks on, seven examples of *Æschna borealis*, Zett., a little-known species of European Dragonflies. He said that some of the specimens were captured by himself at Rannoch, Scotland, in June, 1865, when he was accompanied by Dr. Sharp and the late Mr. E. C. Rye. The other specimens were taken in Luleå, North Sweden, and the Upper Engadine (5000–6000 feet), in Switzerland. Mr. W. H. B. Fletcher exhibited specimens of *Agrotis pyrophila* from various localities, including two from Portland, three from Forres of a smaller and darker form, taken by Mr. Salvage last year, and a melanic specimen from Stornoway, at first supposed to belong to *A. lucerneæ*, but which, on closer examination, was seen to be referable to this species. He also exhibited series of *Triphæna orbona* from Stornoway and Forres, and *T. subsequa* from Forres and the New Forest. The specimens of *T. subsequa* from Forres were more distinctly and richly marked than those from the New Forest, and were also rather more variable in colour. Dr. Sharp exhibited specimens of *Proculus goryi*, Kaup, found by Mr. Champion in Guatemala, prepared to show the rudimentary wings under the soldered elytra. Dr. Sharp called attention to the existence of a peculiar articulated papilla at the base of one of the mandibles; and he also showed sections of the head of *Neleus interruptus* displaying this papilla, as well as the articulated teeth on the mandibles. The Rev. Canon Fowler exhibited specimens of *Agapanthia lineatocollis*, Don, and remarked that they were able to produce a distinct stridulation by the movement of the head against the prothorax, and of the hinder part of the prothorax against the mesothorax; they were also able to produce an unpleasant scent. He further remarked that Dr. Chapman had lately informed him that *Erirrhinus maculatus*, F., had the power of stridulating strongly developed. He also exhibited a specimen of *Barynotus*, taken in Norfolk, which was apparently an abnormal example of *B. obscurus*. Mr. Edward Saunders exhibited, on behalf of Mr. G. A. J. Rothney, in illustration of his paper on Indian Ants, specimens of the following:—*Camponotus compressus* and fragments of *Solenopsis geminatus* destroyed by it; *Camponotus* sp.?, with a mimicking spider (*Salticus* sp.); *Pseudomyrma bicolor*, with its mimicking *Salticus*, and a new species of *Rhinopsis*, viz. *ruficornis*, Cameron, also found with it, and closely resembling its host; *Diacamma vagans*; *Holcomyrmea indicus*, with specimens of the grain which it stores and the chaff which it rejects; and *Aphanogaster* sp., with the pieces of *Mimosa*, &c., with which it covers its nest. Mr. G. A. J. Rothney communicated a paper entitled "Notes on Indian Ants." Mr. Lionel de Nicéville communicated a paper entitled "Notes regarding *Delias sanaca*, Moore, a Western Himalayan Butterfly." Capt. H. J. Elwes communicated a note in support of the views expressed by Mr. de Nicéville in his paper.—H. GOSS and W. W. FOWLER, *Joint Hon. Secs.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—28th March, 1889.—T. R. Billups, President, in the chair. Messrs. J. E. Cutts, of Watford, W. T. Sturt, of Kingston, and W. G. Macmurdo, of Wanstead, were elected members. Mr. Hawes exhibited a variety of *Epinephele ianira* with additional spots on the primaries, and two varieties

of *Zygæna filipendulæ*, both having the central spots and upper spot of the outer pair absent, and the inner pair of spots being very much contracted: the two examples were captured in July, 1876, near Oakleigh Park. Mr. Tugwell, specimens of *Deilephila galii*, bred by him from a large number of larvæ taken at Deal in 1888, together with continental examples of the species, and remarked that the most probable explanation of the unusual abundance of *D. galii* last season was that of immigration, and it had occurred to him that the specimens of the moth taken in the early part of the year were from continentally-fed larvæ; he had, therefore, written to most of the captors of the species, and he found that the measurements of the females ranged from $3\frac{1}{8}$ in. to $3\frac{3}{8}$ in., while out of a total of ninety-two males and females, about two-thirds being the latter, bred by him from English-fed larvæ, the largest was $3\frac{1}{16}$ in.; one, however, had been bred at Liverpool, which measured $3\frac{1}{8}$ in.: this difference of nearly $\frac{3}{8}$ in., in his opinion, clearly proved that the bulk of the 1888 captured specimens had immigrated to England. Mr. Billups exhibited exotic Orthoptera, Hemiptera, and Homoptera, and three species of Coleoptera:—*Sagra buquetii* from Java, *S. chrysochlora* from Australia, and *S. cæruleata* from Madagascar. Mr. W. West, two specimens of *Calosoma sycophanta* (male and female), one captured, 1873, at Freshwater Bay, and the other in Greenwich Park, 1888. The remainder of the evening was devoted to an exhibition of microscopical objects by the members.

11th April.—The President in the chair. Messrs. A. W. Dennis, of Kingsland, and G. E. Dench, of Tufnell Park, were elected members. Mr. Tugwell exhibited a bred series of *Nyssia hispidaria*, showing extreme forms of dark coloration; and a bred series of *Tæniocampa leucographa*. Mr. R. Adkin, *Euchromia mygindana*, *E. arbutella*, and *Coccyx nemorivaga*, bred from larvæ in shoots of the common bearberry (*Arctostaphylos uva-ursi*) from Forres. Mr. South, series of *Plusia iota*, including two of the variety *percontationis*, *P. pulchrina*, and made some remarks on the differences between the two species; two series of *Epunda lichenea*, one from Plymouth and the other from Portland; the specimens from the first-mentioned locality were fairly typical, the others were small greenish grey specimens, with but little, if any, of the pink or reddish tinge characteristic of the type; *Eubolia limitata* and *Bupalus piniaria* from various localities, and made observations thereon. Mr. Jenner Weir, some butterflies, which he had desquamated by the "Waterhouse process," and remarked that although the scales of the wings were dissolved, yet the hairs remained unaffected, and that the green pattern on the wings of such butterflies as *Papilio lurhinus* and *Tirumala petiverana* retained their colour after the desquamation; the markings were not merely superficial in these insects. A paper, "On the origin of the genus *Anthocharis*," by Mr. T. D. A. Cockerell, was read. Mr. Cockerell was of opinion that the genus *Anthocharis* was by no means an ancient genus, and that it arose directly from an old *Pieris* stock, and that probably on the American continent. Messrs. Weir, South, and Tutt made some observations on Mr. Cockerell's paper. Mr. Wilkinson exhibited several species of scorpions; and Mr. White, some of the larger species of Arachnida.—H. W. BARKER, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY. — This Society which was recently started, has already held several meetings in a room at the Medical Institute, Birmingham, which has been secured for the Society by its

Council. Interesting papers have been read, and exhibitions of specimens made. The attendance at the meetings has been good, but additional members are much wanted, in order to place the Council in a position to purchase books for a library, and otherwise carry out necessary work. Entomologists wishing to join are requested to communicate with the Hon. Sec., McCOLBRAN J. WAINWRIGHT, Hall Road, Handsworth, near Birmingham.

ABERDEEN WORKING MEN'S NATURAL HISTORY SOCIETY.—This Society has been formed for the development of Natural-History study in the neighbourhood of Aberdeen. Among the supporters we notice the name of that well-known entomologist, Professor J. W. H. Trail. The first annual Exhibition was held on four evenings in March last, when Entomology was represented by half a dozen or more exhibitors. The address of the Secretary is Mr. ANDREW MATTHEW; 93, Skene Street, Wales Street, Aberdeen.

OBITUARY.

DR. VICTOR SIGNORET died on the 3rd April, as I am informed by a letter from Mons. L. Fairmaire, who deplores the loss of a friend of forty-eight years' standing. Dr. Signoret was a well-known hemipterist of repute, wherever the study of Entomology was cultivated. I do not know the date of his birth, or other private particulars; but the work he accomplished is in our libraries, and that work is careful and thorough. The first paper written by Dr. Signoret bears the date of 1847. It relates to the order Rhynchota and to the suborder Homoptera. Since that time to quite recently, before an insidious disease paralysed faculties that had always been active, a series of faunestic and descriptive papers appeared, with that rhythmical sequence that always denotes the life of the persistent student of our science. For entomologists, as a rule, cannot study without publishing; species and genera must be distinguished; and to prove of universal application must be registered in the only way that civilised man attacks the problem of ultimate knowledge. Of the papers written by Dr. Signoret, certainly not the least important are his '*Revue iconographique des Tettigonides*,' which was commenced in 1852; and his '*Revision du Groupe des Cydnides*,' began in 1881 and completed in 1884. When I remember the care with which the last paper or rather series of papers were elaborated; the material so carefully manipulated and so persistently followed, wherever specimens could be borrowed or figures obtained; the continued correspondence, interrogative and suggestive; the frequent enquiries as to Walker's types, often difficult to satisfy for lack of equal comprehension of an obscure group of insects;—the thought arises that this will prove to be Signoret's greatest contribution to Entomology. I have been under no inconsiderable obligation to my late colleague: the loan of specimens, information, advice, were always at disposal and frequently solicited. His writings were never disfigured by that amateur criticism which affords a retreat for mediocrity; and if one may search in vain amongst them for theories, the facts will be found on which philosophical theories in Entomology can alone be founded. The names of Stål and Signoret will ever be familiar words to the student of the Rhynchota.

—W. L. DISTANT.





A1



A2



B1



B2



B3



C1



D1



C2



D2



E



F



G

West, Newman & Co. chromo.

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NOTES ON SOME VARIETIES OF *TRIPHÆNA COMES*, HB.,
= *ORBONA*, FB.

BY J. A. CLARK, M.P.S., I.D.S., F.E.S.

(PLATE VI.)

IN the autumn of last year I obtained a series of the variable Forres form of this species, together with a number of ova. These hatched, and I reared the larvæ through the late autumn on dock leaves (*Rumex pratensis*) in a warm room, thereby avoiding the large percentage of loss which usually occurs when it is attempted to hybernate them. On December 3rd the first of the specimens appeared, and the bulk of the remainder by the 15th, a few stragglers lagging behind till the last week in January.

The result was a fine series, consisting of thirty-six specimens, the whole of which were totally different from our usual southern forms, and, *inter se*, they presented a very considerable difference, both in shade and markings, as will be seen from the accompanying plate. The series may be divided into four main groups, and a fifth containing varieties, which can hardly be collated with any of the other forms. They are as follows:—

Group A.—The pallid or clay-coloured form, which more nearly resembles the typical South of England form than any other. This is illustrated by two examples. Fig. A, 1, where we have the markings similar to the usual South of England type, but the coloration intensified. Fig. A, 2, like fig. 1, but the fore wings more suffused with reddish colour, and the lunules on the fore wings rufous.

Group B.—Fig. B, 1. Fore wings rufous, with but indistinct markings; the submarginal line is almost absent. Fig. B, 2. A more intensified form of fig. 1, with the subterminal line very distinctly marked. Fig. B, 3. This is a beautiful variety, the fore wings having a rich, almost crimson, shade suffused over

them; the stigmata are darker, and delicately edged with a golden line; on the costa is a dark spot, which at the first glance gives the insect the appearance of a rufous type of *Triphæna orbona*, Hufn., = *subsequa*, Hb. Closer inspection, however, proves that it is a true *T. comes*.

Group C.—Var. *curtisii*. This is a richly-coloured series, quite distinct from either of the foregoing, the colours indeed reminding one rather of *Triphæna interjecta*, Hb., than the ordinary *comes*. Fig. c, 1. The colours of the fore wings of this variety are a rich claret-red, with no dark markings, even the stigmata being only indicated by outlines of golden yellow; the hind wings are quite smoky throughout, and the black border very broad. Fig. c, 2. This is a still darker form, the fore wings being a rich ruddy umber, almost black, on the hind and inner margins, and the discoidal spots are clearly defined by fine golden outlines.

Group D.—Fig. d, 1. In this variety the general tone of the fore wings is as intense as that of c, 2, but the claret colour is giving place to a dark slate; the pale line beyond the discoidal spots is very distinct. Fig. d, 2. Here we have the clay colour of the first set, the rusty line of the second, and the rich claret-red of the third series entirely replaced by a dark slate or smoke colour, with hardly any markings at all.

Of the unclassified series, Fig. e is the most singular: it is a very rich blue-slate colour, suffused with red on the costa, all the markings, except the inner lines, being very distinctly picked out. Its great features, however, are to be found in the hind wings: the right wing is like d, 2, with the usual lunule; but the left is very much paler, and has no lunule spot at all. Fig. f. In this variety the base of the fore wings is pale, the centre is dark like d, 2, and the tip and costa paler, with the terminal bands very distinctly defined; the hind wings are a greyish yellow, the left being lighter than the right; the band is paler, and of a smoky black. Fig. g. This can hardly be referred to any of the other groups, though it more nearly resembles a redder form of fig. 2; the subterminal line is very dark and distinct, while the inner lines, too, are very clearly defined; the whole fore wing, indeed, is richly mottled with delicate lines and patches of colour; the hind wings are somewhat like the last variety, but rather brighter.

Of the series of 36 which were reared from this brood of ova, 8 belonged to group A, 14 to group B, 14 to group C, and none to D. Those of group D and the unclassified series were captured.

The intensity of the colouring of group B, and more especially of group C, cannot adequately be shown by any lithograph, as there is a warmth and depth of colouring giving them a wonderful richness, which is lost in the printing.

It is singular that while *Triphæna comes* should present such remarkable varieties,—such, indeed as would warrant their being called new species, could their various gradations be not traced southwards to the locality of the typical *comes*,—yet *Triphæna fimbria* and *T. interjecta*, bred from the same locality, present no difference in form to the southern types.

The Broadway, London Fields, N.E., March 5, 1889.

ON THE VARIATION OF INSECTS.

By T. D. A. COCKERELL.

(Continued from p. 130.)

Class II.—VARIETIES OF FORM.

a. *In the Form of the Markings.*

THESE variations, though differing apparently from any of those enumerated under Class I. (in that they are not due to a change of colour, a change of structure, or necessarily a change in the proportions of the colours), are probably not to be distinguished from them. The question at issue is briefly this—Do all variations in the markings of insects follow the same law, differing only in intensity and not in kind, or do they strike out to form new patterns, different from anything which could have arisen merely from an increase or decrease of the intensity of the pre-existing markings? Mr. Scudder has argued that the markings on the wings of Lepidoptera arose from simple dark transverse bands, which by coalescence and division, have given rise to spots, streaks, and even ocelli.* Assuming a number of transverse bands, which have been subject to a tendency to be interrupted at intervals, it is easy to see how the wings might have become ornamented with a number of equidistant spots. These spots, if allowed to coalesce either in a lateral, transverse, or oblique direction, or to become enlarged or suppressed, or “redistributed, centripetally or centrifugally” (Darwin), will probably give us all the markings that we see on the wings of insects. These spots, the result of the breaking-up of the primitive bands, are well seen in an American moth, *Tephrosia cribrataria*, Guen. According to this view, the streaked or rayed varieties (such as *Spilosoma menthastri walkeri*, Curt.; *S. urticæ radiata*, figured by Mr. C. A. Briggs (Entom. xxi. 97); *Lycæna astrarche*, var. from Surrey (Entom. xii., 185, and fig.); *L. icarus*, var. Newman, Brit. Butt., 128; *Chrysophanus phlæas*, var. (tom. cit., 115) will fall under Class I., “n. Coalescence of dark markings.”† Staudinger,

* See also Darwin, ‘Descent of Man,’ 2nd ed., pp. 428—440.

† The recently described *Metacrias strategica*, Hudson (Entom. xxii. 53), probably owes the ornamentation of its fore-wings to an ancestral “*radiata*” variation.

in his description of *S. m. walkeri*, clearly indicates its true nature. The form *zatima* or *radiata* of *S. lubricipeda* seems to occur almost exclusively in Heligoland, but to be quite usual there (see 'Naturalist, 1888, 220).

A far more puzzling variation is that of *Colias edusa* (recorded in Entom., 1878, by Mr. E. A. Fitch), in which the black spots on the fore-wings were distinctly trilobed, and at the same time the outer margins of the wings were wavy. The specimen was captured at Colchester.

b. *In the shape and development of the Wings.*

The outline of the wing, especially in species of Lepidoptera, is liable to considerable variation, although the varieties are generally rare. The "tails" of butterflies seem much more variable than any other point in the outline of the wings, as, for instance, in *Thais cerisyi* (varying from the form *caucasica*, Ld., with no tails, to the three-tailed *deyrollei*, Oberth.), and in *Chrysophanus phlœas*, which has a var. *eleus*, F., described by Staudinger as "*v. caudata*, supra *nigricans*." Sometimes the wings vary in the direction of being broader or narrower, as, for instance, *Colias edusa angustior*, Entom., xi. (E. A. Fitch), which had the wings narrower and longer in proportion than is usual. The example was bred, and abnormal external conditions may have led to its peculiarity.

The late Mr. Pryer has recorded some extraordinary seasonal variation in the shape of the wings of a Japanese *Terias*. The hibernating form, it appears, is large and has pointed wings, while the summer form is small and with rounded wings. It has been suggested, however, that there was some error in the experiments made,—that the larvæ or eggs of *T. læta* were somehow introduced into the breeding-cage, and so gave rise to imagines which were supposed to have come from eggs of *bethesba*,—but in the face of Mr. Pryer's emphatic declaration that this was not the case, it is difficult to raise that objection. At any rate it is very exceptional, and on the North-American continent, where seasonal variation is so familiar, anything like it is unknown. Mr. W. H. Edwards has kindly given me his opinion on the matter, and writes of the American *Rhopalocera*:—"I can say this, so far as my experience goes, there is no essential difference in shape of polymorphic forms of one species. What difference there is is in the lengthening or shortening of tail (*Ajax*), the greater falcation of apex (*Grapta interrogationis*): I recall no changes in this line except in these two species. But the changes are of colour, as a yellow *Colias* from an orange one, &c." (*in litt.* March 5th, 1888).

The development of the wings does not always take place as fully as is usual, and the consequence is that we have cripples,

apterous forms, &c. I am disposed to consider that the semi-apterous females of certain moths arose by the perpetuation of this condition, from winged ancestors; and it is even possible that the whole order of Diptera was originally four-winged, and that the halteres represent what were once efficient flying organs, although no doubt the progenitor of all insects was wingless, or arose from a wingless form.

A wing arises in the form of a sac, which in development becomes expanded; if from any cause this sac, or part of it, fails to expand, the wing wholly or partly fails to spread to its normal size. Probably the two main factors in producing the cripples that are seen in breeding-cages are want of moisture and external injury involving a perforation of the wing-membrane; but sometimes, as in the case of the variety of *Ocneria dispar*, with the lower wings notched (Entom., 1878, 170), this peculiarity tends to become permanent, and is actually so in the female of *Orgyia antiqua* and other moths. It is, therefore, necessary to find some other cause to explain these cases, since they cannot well be the simple result of external conditions; and I have thought that an abnormal coalescence of the wing membranes may have been the origin of the peculiarity, and have become perpetuated in certain cases until it became normal.

I have note of two instances in which the hind-wings of Lepidoptera failed to develop at all, one in *Sphinx ligustri* (B. Cooper, Entom., xi. 20), and the other in *Cidaria testata* (W. C. Boyd, Entom. Soc., Nov. 5th, 1879), while Mr. South has recorded "an apparently apterous specimen" of *Zygæna filipendulæ* from Folkestone (Ent. Mo. Mag., 1887, 139).

A few cases have been put on record, in which Lepidoptera exhibited an extra wing—five in all. This has happened in *Samia cecropia*, *Limenitis populi* (Entom. Amer., vol. i., 1885, 56), and *Gonepteryx rhamni* (Ent. Mo. Mag., 1878, 189). I have never seen any of these, and so cannot easily guess at their nature; they may be either caused by the division (or apparent division) of one of the wings into two, much after the fashion of the Pterophoridae; or they may represent two coalesced ova, like the two-headed calves and other such monstrosities.

(To be continued.)

DESCRIPTION OF A NEW BUTTERFLY FROM TRINIDAD.

BY W. F. KIRBY, F.E.S.

TITHOREA FLAVESCENS.

EXPANSE from $2\frac{1}{4}$ to $2\frac{1}{2}$ inches. Dark brown, with yellow markings, more or less tinged with tawny, especially towards the base. Fore wings rather pointed, the hind margin slightly oblique, very slightly sinuated, and not convex, hind wings with the hind margin regularly rounded and

slightly sinuated. Fore wings dark brown, with the principal nervures orange towards the base, and in the yellow portions of the wing; from the base run two yellow stripes, the first curves through the cell, till it descends on the median nervure, after which it is slightly interrupted before meeting a large yellow band divided by the nervures, which crosses the end of the cell towards the hind margin. Just beyond the cell is a large oblong black spot, and there is a smaller one between the 2nd and 3rd branches of the median nervure, which are generally surrounded with yellow. Below this point are two submarginal yellow spots, the upper one irregular, and the second round, above the hinder angle of the wing. The lower basal streak is divided by the submedian and first branch of the median nervure, and extends to about four-fifths of the length of the wing. Towards the tip is an oblique row of four yellow spots; the uppermost, above the submedian nervure (which is here black), is a mere streak.

Hind wings yellow, with all the borders brown, and a brown band den-
tated beneath towards the extremity, runs from the middle of the inner margin, nearly across the wing, but ceases before reaching the border. Under surface similar, but the yellow markings are paler, and rather more extended, most of those on the fore wings being confluent; hind margins with a row of submarginal white spots between the nervures, mostly arranged in pairs; hind wings with a curved subcostal basal stripe. Head spotted with white, orbits white; antennæ fulvous, black towards the base. Thorax with fulvous hairs above; the sides spotted with yellow; legs black, femora streaked with white, abdomen black above and yellow beneath.

This species belongs to the group of *T. harmonia*, Cram., but is of a much paler colour than any of its allies. It is abundant in Trinidad, and is extremely constant in its markings. I have never seen it from any other locality; and like *Papilio cymochles*, Gray, and one or two other species, it appears to be peculiar to that island, which, however, is so close to the neighbouring coast of South America, that its insects properly belong to the fauna of that continent, and not to the West-Indian fauna.

Zoological Department, Brit. Mus. (Nat. Hist.), S. Kensington,
April, 1889.

LEPIDOPTERA OF WIMBLEDON.

BY F. G. WHITTLE.

THE following is a list of Lepidoptera taken on, and in the neighbourhood of, Wimbledon Common; it represents my own captures, extending over more than one season:—

<i>Vanessa polychloros</i> , 24th July, not common.	<i>Sarothripus undulatus</i> , netted 19th July, 14th Aug., and 21st Sept.
<i>Lycena argiolus</i> , 14th April and 2nd August.	<i>Hylophila prasinana</i> , larva common on oak in the autumn.
<i>Smerinthus ocellatus</i> , 15th August, larva not uncommon. <i>S. tilia</i> , larva in July.	<i>Nudaria senex</i> , 20th July.
	<i>Nemophila russula</i> , 2nd July, not uncommon near the flagstaff.

- Cossus ligniperda*, 26th June, at sugar.
- Dasychira pudibunda*, larva on sawallow in October.
- Drepana lacertinaria*, larva beaten early in October, from birch on Putney Heath. *D. falcatoria*, 23rd June, at a gas lamp. *D. binaria*, larvæ are rather common, early in October, on oak.
- Cilix glaucata*, 2nd August, at rest on whitethorn, Putney Heath.
- Pterostoma palpina*, 19th August, at a gas lamp.
- Lophopteryx camelina*, larvæ are common on oak in September.
- Notodonta dictæoides*, once on 21st July, clasping an elm twig in Stag Lane. *N. ziczac*, 3rd September, one larva beaten from sawallow in the ravine.
- Thyatira derasa*, 16th July, at sugar. *T. batis*, 7th July, at sugar.
- Cymatophora duplaris*, 7th July, on the wing.
- Asphalia flavicornis*, 4th March, one only on Putney Heath.
- Hydræcia nictitans*, 7th and 21st August, common at sugar.
- Cerigo matura*, 28th July, at sugar.
- Caradrina morpheus*, 5th July on the wing.
- Agrotis puta*, 24th August, at sugar. *A. saucia*, 27th September, at sugar. *A. nigricans*, 26th July, at sugar.
- Noctua glareosa*, 7th September, common at sugar. *N. plecta*, 19th August, at sugar. *N. c-nigrum*, 3rd September, at sugar. *N. umbrosa*, 25th August, at sugar.
- Triphæna anthina* and *fimbria*, April, larvæ on nettles in Stag Lane. *T. interjecta*, 19th August, on the wing.
- Taniocampa gracilis*, 10th April, at sawallow catkins.
- Orthosia lota*, larva on blackthorn in May.
- Anchocelis litura*, 21st September, at sugar.
- Xanthia fulvago*, 24th September, at sugar. *X. flavago*, 17th September, at sugar.
- Tethea subtusa*, 30th August, on a fence in Kingston Vale.
- Calymnia diffinis*, on sugared elms in Stag Lane.
- Miselia oxyacanthæ*, larva in May.
- Hadena protea*, 2nd September, at sugar. *H. dentina*, 21st July, at sugar.
- Xylocampa areola*, reared a nice series from ova deposited by a moth taken in April.
- Calocampa vetusta*, 27th September, at sugar.
- Heliaca benebrata*, 23rd May, near the Beverley brook.
- Catocala nupta*, a pupa under willow bark in August.
- Epione apiciaria*, a larva taken from willow on the 15th August, produced a moth on 9th September.
- Angerona prunaria*, netted 17th July.
- Pericallia syringaria*, netted 10th July.
- Eugonia alniaria*, pupa under willow bark, 17th August.
- Amphidasys strataria*, 8th April, on a fence in Kingston Vale.
- Geometra papilionaria*, 8th July, a female hovering over hazel.
- Zonosoma porata*, 3rd August. *Z. punctaria*, larva very common.
- Acidalia imitatoria*, netted 9th July. *A. emarginata*, netted 18th July.
- Timandra amatoria*, 21st June, near the Beverley brook.
- Aspilates strigillaria*, netted, 3rd June.
- Larentia multistrigaria*, 10th April, common at gas lamps.
- Eupithecia exiguata*, at rest, 21st June.
- Coremia designata*, beaten, 13th June.
- Scotosia vetulata*, netted, 18th July.
- Pelurga comitata*, netted, 8th Aug., in Stag Lane.
- Eubolia cervinata*, 1st October, at a gas lamp.
- Endotricha flammealis*, 3rd August, abundant.

Ebulea verbascalis, netted, 3rd Aug.
E. sambucalis, 22nd June, at rest
 on a fence.

Scopula ferrugalis, 31st August, at
 rest, Putney Hill.

Crambus pinellus, 9th August, rather
 common.

Dichelia grotiana, 23rd July.

Leptogramma literana, 22nd August,
 a single example on an oak trunk.

Peronea variegana, 25th July, com-
 mon.

Penthina pruniana, 25th June.

Antithesia salicella, 2nd July, on a
 fence in Alton Lane.

Aspis udmanniana, 23rd June,
 among bramble.

Sideria achatana, 22nd July.

Phtheocroa rugosana, 15th May,
 among bryony in Stag Lane.

Grapholitha subocellana, 30th May,
G. minutana, 15th July, not

uncommon on fences in Alton
 Lane.

Pædisca bilunana, 9th June, common
 on birch trunks. *P. solandriana*,
 an interesting series bred from
 larvæ found between leaves of birch.

Semasia wæberiana, 1st July, on a
 fence at Putney.

Coccyx argyranæ, 8th June, oak
 trunks in Richmond Park.

Stigmonota perlepidana, 7th May.
S. regiana, 11th July, on a fence
 at Putney.

Pyrodes rheediella, beaten, 14th May.
Catoptria albersana, 27th May.

Dasytoma salicella, 29th March.

Micropteryx subpurpurella, 20th
 May.

Adela cuprella, 23rd April, flying
 over shallows.

Harpieteryx xylostella, 1st August.
Dasycera olivierella, 18th July.

2, Cambridge Terrace, Lupus Street, S.W., 1889.

CONTRIBUTIONS TOWARDS A LIST OF THE VARIETIES OF NOCTUÆ OCCURRING IN THE BRITISH ISLANDS.

By J. W. TUTT, F.E.S.

(Continued from p. 138.)

Charæas, St., *graminis*, L.

The type of this species is described by Linnæus in his 'Systema Naturæ' (10th edition), p. 506, No. 50, as, "*Bombyx spirilinguis alis depressis griseis: linea ramosa lunulaque glaucis.*" It is a most variable species, not only in ground colour, which varies from a dull grey through different shades of brown to a ferruginous red, but in the character and quantity of the pale markings. The type has the branched central line and reniform glaucous; most British specimens have them white; whilst others have only the forked end of the central line and reniform white, the base of the line and branches being almost of the ground colour, whilst, on the other hand, I have specimens in which the white median nervure develops into a broad band, with many branches, running longitudinally through the centre of the wing from the base to beyond the reniform. As in all this family, there is great variation in the size and shape of the stigmata, and the females are, as a rule, much larger, and less liable to variation than the males. Mr. Porritt writes me that

"red and grey forms in both sexes occur in the Huddersfield district." There are numbers of intermediate forms, but the following are some of the most striking forms that have been described:—

1. Grey, with branched central line and stigmata glaucous, = *graminis*, L.
2. Grey, with white three-branched central line, stigmata yellowish, = *gramineus*, Haw.
3. Red-brown, with ochreous ramose central line, ochreous stigmata, = *tricuspis*, Esp., ♂.
4. Red-brown, with white ramose central line, whitish stigmata, = *tricuspis*, Hb., = var. *rufa*.
5. Grey, with red costa, with ochreous ramose central line, ochreous stigmata, = *graminis*, Hb., = var. *rufo-costa*.
6. Dull yellowish brown, with ochreous ramose central line, ochreous stigmata, = *hibernicus*, Curt.
7. Pale ochreous yellow, with dark nervures, white orbicular and reniform with a bifid line joining base of reniform, = *tricuspis*, Esp., ♀, = var. *ochrea*.

The first five make the only reasonable method of arrangement of the varieties which can be readily adopted, and include most of the general forms. From Curtis's figure, pl. 451, it can be seen that No. 6 is only an extreme modification of No. 3, and I have never seen an extreme form like No. 7, although Mr. Dobrée has it from Southern Germany. Two other marked forms occur: one unicolorous dull grey-brown, with all the ordinary pale transverse lines of the same colour as the rest of the wings, but slightly paler, the whitish reniform and a white blotch at its base alone being distinct of all the original markings; another form has the central ramose line developed into a large white blotch. In Humphrey & Westwood's 'British Moths,' p. 113, we find:—"Varieties occur with the fore wings of a uniform colour, except the pale yellow marks and stigmata; and others have the latter markings edged with black on a plain ground."

a. var. *gramineus*, Haw.—No. 2, above. This is described by Haworth as, "Alis griseis linea trifurca alba, stigmatibus pallidis, lineolisque acutis ad apicem atris." "Affinis præcedentibus (*popularis*) at duplo minor; antennis ferrugineis minus pectinatis et absque strigis moniliformibus. Maris alæ anticæ griseæ linea media trifurca albida a basi post-medium ducta; supra lineam maculis tribus nigris difformibus parvis et stigmata ordinaria lutescentia circulo pallidiore: subtus lineam macula altera nigra trigona, et stigma tertium teliforme lutescente nigro cinctum sed aliquo interruptum; subtus hoc stigma lineola nigra ad marginem tenuiorem prope basin. Ordo transversus punctorum nigrorum cuspidatorum versus marginem posticum. Alæ posticæ fuscæ, ciliis flavicantibus" ('Lepidoptera Britannica,' pp. 117, 118). This is probably the most common form

occurring in Britain. I have it from Glasgow, Sligo, Yorks, and many other localities, north and south.

β. var. *tricuspis*, Esp. No. 3, above. Esper's *tricuspis*, pl. lxxviii., figs. 2 and 3, may be described as follows:—Fig. 2, ♂. "Anterior wings deep reddish brown, with a short, two-forked, longitudinal, basal mark starting from centre of thorax; between this and the base, and extending along the median nervure, is an ochreous longitudinal blotch, which is in contact with the orbicular and reniform, the blotch branching beyond the reniform. All the markings dull ochreous grey." Esper's fig. 3 is a pale ochreous form, which he calls a ♀, but from the tufted anal segment it would appear to be a ♂. Of *tricuspis*, Esp., Guenée writes:—"The ordinary stigmata and the bidentate spot confluent, also the claviform, and prolonged in bright yellow almost to the base of the wing" ('Noctuelles,' vol. v., p. 176.) This should include all reddish forms with ochreous markings. I have this variety from Sligo, Glasgow, Morpeth, &c. Continental lepidopterists often send out as *tricuspis*, Esp., varieties which differ very much from Esper's figure; many of the specimens have a white central line instead of ochreous, and others are more like Haworth's *gramineus*.

γ. var. *rufa*, mihi.—No. 4, above. This is Hübner's *tricuspis*, fig. 143, which may be described as:—"Anterior wings dark reddish, with a pale streak below the costa; orbicular indistinct; the pale median nervure, touching the base of the orbicular and reniform, makes at the base of the reniform two distinct white branches; the wedge-shaped spots parallel to the hind margin are preceded by a pale band." Of this variety Guenée says:—"Hübner's fig. 143 is a strongly-marked variety, but entirely accidental" ('Noctuelles,' v. p. 176). Staudinger's description of *tricuspis*, Esp., does not apply so well to that form as to var. *rufa*. He says:—"Al. ant. unicolor rufescentibus, mac. magna trifida alba." This name should include all red forms with white markings. I have this variety from Sligo, Glasgow, Yorkshire, &c.

δ. var. *rufo-costa*, mihi. No. 5, above. This is Hübner's *graminis*, fig. 480, which may be described as:—"Anterior wings grey, with bright red costa from base to apex; stigmata ochreous, median nervure branched, ochreous; that part of the wing just around the stigmata dark reddish brown; beyond the reniform a broad red patch extends from the costa to the inner margin; the ordinary row of wedge-shaped spots parallel to the hind margin." I would include all forms with a red costa under this name. I have only specimens from the Hebrides of this variety, but it undoubtedly occurs elsewhere.

ε. var. *hibernicus*, Curt.—Curtis's description ('British Entomology,' p. 451) is as follows:—"Dull yellowish brown; superior wings with an elongated pale ochreous spot at the base above the central nervure, and another subelliptical one more towards the middle, with a lemon-shaped one above it; beyond the middle is a trapezoid spot resting on a trifid character all of the same pale colour, some of them being partially relieved by a dark brown; between the nervures at the posterior margin are obscure, elongate-trigonal brown marks; abdomen and inferior wings fuscous, cilia pale ochreous. I am fully aware that *C. graminis* is a most variable species; but as I have never seen one similar to the specimen figured, I consider it may be a distinct species. It was captured last September in the county of Mayo, Ireland." I have this variety from

Mr. Russ, of Sligo; and Mr. Gregson (Entom. iv. 51) records it from Staleybridge Brushes.

ζ. var. *ochrea*, mihi.—No. 7, above. Anterior wings of a pale ochreous yellow, with dark nervures, with whitish or ochreous reniform and orbicular, the former joined with a bifid line, the extension of the pale central line. It is figured by Esper as a ♀ of var. *tricuspis*. I have never seen specimens of this variety. The nearest approach that I have to this form came from Mr. Russ, of Sligo.

η. var. *obsoleta*, mihi.—Anterior wings unicolorous dark grey, with no pale markings whatever, except the trifid mark made up of the reniform, and a bifid patch joined below it. I have this variety from Mr. Finlay, of Morpeth, Mr. Russ, of Sligo, and it is obtained by Mr. Harrison, of Barnsley.

θ. var. *pallida*, mihi.—Anterior wings dark grey, but the white central median line developed into a broad white band, including the claviform, orbicular, and reniform, and extending over the whole of the centre of the wing. I have this variety from Sligo and Yorkshire localities.

ι. var. *megala*, Alph.—In 1883 Dr. Staudinger had in his trade list a doubtful variety of this species from Turkestan. The name I find is also retained (as a distinct species, however) in the last trade catalogue of Herr Heyne, Leipzig. Of this variety Mr. Dobree writes:—"I obtained a male, which is small, and closely resembles *tricuspis*, Esp., differing only in that the ground colour, blotch, and markings are all fainter, giving the insect a more generally unicolorous look."

κ. var. *albineura*, Bdv.—Boisduval, in his 'Icones, &c.,' pl. 74, fig. 4, figures a variety of *graminis*, which I have been unable to refer to. In his 'Noctuelles,' vol. v., p. 176, Guenée writes, "I have not seen in nature Boisduval's *albineura*, which appears to be simply a variety of *graminis*;" and in the 'Entomologisk Tidskrift,' 1884, p. 161, referring to this variety, Herr Sven writes, "Likuar hufvudformen, men cellerna äro svarta uti framvingarnes basal-och mellanfält, samt nära utkanten."

λ. var. *albipuncta*, Sven.—Herr Sven, 'Entomologisk Tidskrift,' 1884, p. 161, describes a variety as, "framvingarne rödbruna, med svartaktiga ribbor, samt en hvit punkt i njurfläckens bakkant, ♀, Sällsynt."

μ. var. *brunnea*, Sven.—Sven, 'Entomologisk Tidskrift,' 1884, p. 161, describes his var. *brunnea* as, "framvingarnes grundfärg rödbrun." "Hvad framvingarnes teckningar angår, så äro äfven dessa underkastade måndfaldiga variationer, Bland de många exemplar, Lektor Sven insamlat, äro nedanstående afvikande former de anmärkningsvärdaste."

Pachetra, Gn., *leucophæa*, View.

Vieweg, in his 'Tabellarisches Verzeichniss,' &c., p. 23, No. 28, thus describes the type of this species:—"Noctua *leucophæa* alis incumben-tibus dentatis griseo fuscoque variegatis, maculis ordinariis albidis." This short Latin diagnosis he follows up with a much fuller description in German, as follows:—"The antennæ of the males are pectinated. The toothed fore wings are whitish grey, with darker shades. In the middle of the wing are an orbicular and reniform stigma, both of a whitish colour. Beneath the orbicular stigma is a black mark, like a Greek ζ. Near the hind margin runs a whitish transverse line, with a row of black

triangular spots, pointing to the base of the wing. The hind margin is black and white-spotted. The hind wings are grey. Under side of fore and hind wings with a dark spot and a transverse line." This species is very rare in Britain, although most cabinets contain specimens, which their possessors *believe* are British. On the Continent, however, the species is in many places common. Hübner, under the name of *leucophæa*, figures (fig. 80) a specimen of a pale grey ground colour, with a much darker central band, having a purplish tinge. The darker markings, however, are much as in the figure in Newman's 'British Moths,' p. 295, but there are only two of the black wedge-shaped spots parallel to the hind margin. The specimen is a large female. Geyer, in his supplement to Hübner's 'Schmet, &c.,' figures (817) another female, of bad shape, but purplish in colour. Fabricius describes this species under the name of *fulminea*, his description of the species agreeing almost precisely with that of Vieweg. It is as follows:—"Bombyx alis incumbentibus dentatis griseo fuscoque variegatis, thorace antice albo; striga nigra" ('Entomologia systematica,' &c., p. 484, No. 241). Newman, in his 'British Moths,' p. 295, says, "tinged with ochreous," which has been the case with several specimens I have seen. These "ochreous-tinged" specimens would appear to be Hübner's *vestigialis* (described below), whilst a peculiar slaty form, with dark red central band, is figured by the same author under the name of *ravida*. It is also the ochreous form which is the *leucophæa* of Guenée's 'Noctuelles,' vol. v., p. 177, where he writes, "Superior wings of a greyish white, tinged in places with yellowish, and shaded with brownish black," &c. Taking the white and fuscous form as the type, there seem to be the following varieties noted by other authors:—

1. Speckled with ochreous, = *vestigialis*, Esp.
2. With the central area red, = *ravida*, Esp.
3. Smaller than type, = *bombycina*, Ev.

α. var. vestigialis, Esp.—Esper (vol. iii., pl. liii., fig. 5) figures a form of *leucophæa* under this name, of which I made the following description:—"Male. Pectinated antennæ; ground colour greyish brown, with yellowish nervures; a white patch at base of wing directly under costa, followed by a double whitish basal line, edged interiorly with black. Claviform of ground colour outlined in black and then with white; orbicular reaching to costa, outlined in white and then with black; reniform also outlined in white and then with black; a black wavy line from base of reniform to the inner margin; six short black costal streaks above the reniform and towards the apex; a series of black wedge-shaped spots parallel to hind margin; fringes alternately dark and pale grey. Hind wings grey, paler in centre and towards the upper margin; lunule in this paler space, dark hind margin, extreme outer edge whitish." His figure 4 on the same plate is a female, "much more brightly marked, more variegated, orbicular not reaching costa; ground colour deeper, and with a slight reddish tinge, a wavy transverse line parallel to hind margin." This variety is, as mentioned

above, the *leucophæa* of Guenée. Under this name I would include all specimens speckled with ochreous.

β. var. *ravida*, Esp.—Esper (vol. iv., pl. 145, fig. 1) figures another variety of *leucophæa* under this name. The description I have made is as follows:—"Female. Anterior wings grey, with a slaty shade along the costa, in which are four short black costal streaks; there are two black transverse basal streaks; the claviform brown, edged with black; reniform and orbicular slaty, outlined in pale. Directly beyond reniform is a white transverse wavy line, edged internally with black; all the wing, between this transverse line and the base, tinged with reddish brown, except the costa and inner margin, which are of a slaty colour; a wavy *W* line parallel to the hind margin, pale, but internally edged with black. The space outside this waved line, and between it and the hind margin, deep reddish brown. Hind wings dark grey, central area paler, which contains a dark lunule, paler; immediately beyond the lunule is a dark transverse line, extreme hind margin paler." Guenée, in his 'Noctuelles,' vol. v., p. 178, writes of this variety, "all the median space reddish, lines and stigmata well marked. Between the lunule and the subterminal shade of the inferior wings is a median line. Locality, Bavaria."

γ. var. *bombycina*, Ev.—Staudinger mentions in his 'Catalogue' a variety under this name, which is there described as "minor." I know nothing of it.

(To be continued.)

ENTOMOLOGY OF ICELAND.

By REV. F. A. WALKER, D.D., F.L.S., &c.

HAVING been unable to discover any notice of the Entomological fauna of Iceland in any volume of the 'Entomologist' since its commencement, I judged that a brief *resumé* of the very imperfect knowledge that we possess on this particular subject might be acceptable to its readers.

I have studied the works on Iceland of several travellers, and also corresponded with others who have paid a visit there, with the view of definitely ascertaining the existence of butterflies. The preponderance of evidence obtained after a great deal of trouble on my part was in favour of their existence, though no particular species could be certainly ascertained. I may add that their occurrence in that Arctic region has been the subject of dispute; and that Staudinger, who visited the island more than thirty years since in 1856, has furnished a list of 33 species of moths, and of 81 beetles, 114 kinds in all, in the 'Proceedings of the Entomological Society of Stettin,' but mentioning no butterflies whatever.

The catalogue contained in the Appendix to the work on Iceland, by Pajkull, a Swede, is less satisfactory than that of Staudinger, as containing even fewer species, and also recording no butterflies, though including some Hymenoptera and

Diptera. Moreover, I believe it has not the merit of being original, but was compiled from the work or observation of some Frenchman. And among the ninety odd species here recorded are included Arachnida, Acari, &c.

I refrain from giving Staudinger's and Paijkull's lists *in extenso*, for fear of trespassing on your valuable space; but I give the following extracts, from various sources, as an addition to the knowledge that we possess on the subject of the Icelandic Fauna. At a later period of the year I hope to enlarge this knowledge by actual observation during a visit I propose to the island this summer.

(1.) "In the neighbourhood of the river (Bruarâ, or Bridge River), we saw many small butterflies, blue and white, both fluttering and flying kinds."—(Symington's 'Pen and Pencil Sketches of Faroe and Iceland, 1862,' p. 105).

(2.) "I did not see a collection of insects in the museum, but I have just heard from my friend, who reports having seen one or two butterflies, one was blue, also several beetles, and some moths." This is an extract from a letter of a correspondent of mine who visited Iceland in 1888.

(3.) "One of these swamps put me in a position of much difficulty and embarrassment during one of my solitary excursions. I was sauntering quietly along, when suddenly a little butterfly fluttered past me. It was the first I had seen in this country, and my eagerness to catch it was proportionately great. I hastened after it, thought neither of swamp nor of danger, and in the heat of the chase did not observe that the mounds became every moment fewer and further between."—Ida Pfeiffer's 'Visit to Iceland,' p. 81. Madame Pfeiffer does not add that she caught the insect in question, and it is just possible, that not being a professed entomologist, she may have mistaken a moth for a butterfly.

(4.) For the accompanying list of half-a-dozen species of butterflies reputed to occur in Iceland, I am indebted to Mr. Kirby's kindness:—*Colias pelidne*; *C. nastes*; *C. hecla*; *Argynnis freyja*; *Æneis jutta*; *Æ. æno*. I believe, however, that the existence of these species in Greenland is the only argument for their supposed existence in Iceland, Greenland and Lapland being portions of the mainland of America and Europe, and this makes all the difference.

(5.) "If the main difference between a moth and a butterfly is that the wings of the former lie flat, and those of the latter stand up:ight when the insects are not on the wing, then I think I may certainly assure you that there are butterflies in Iceland. I remember distinctly having chased them in my youth. Last time I was in the island, the year before last (1887), I was on the look out for moths and butterflies, knowing that the existence of the latter was disputed, but I never saw one individual of either kind all the time. I ascribed it to the fact that the country was surrounded by closely-packed Arctic ice all through July and August, the warmest months of the season; and that off and on the chilliness of the atmosphere was insufferably keen. But, in warm summers, I remember from my boyhood the fields and meadows were quite alive with winged insects; moths or butterflies, I could not say with certainty. I should have imagined, judging from my recollections, that the chief haunts of moths (and butter-

flies, if there be any), would be the manured home-fields (grass plots round the homesteads) at the time when the grass is ripe for mowing, *viz.*, early in July, at which time the not inconsiderable number of flowers that take advantage of the shelter of the grass are also at their best. I don't think I am wrong in saying that *in a cold season*, which in Iceland means an 'ice-summer,'—if there is no 'ice,' the season is delightfully genial,—search for butterflies and moths should be made as far up inland valleys as the altitude of the terrain makes advisable, or midway between sea-draught and glacier-draught. In a warm season I suppose it matters little where the search is made on the lowlands of the island."—(Extract from the letter of another correspondent, who is a native of Iceland, April, 1889).

Apropos of Staudinger's list, I may add that he considers that the total sum of the species of insects found in Iceland is about 312 kinds, and that over one-third of these (110) consists of Diptera; almost one-fourth (81) of Coleoptera; one-fifth (61) of Hymenoptera; one-tenth (33) of Lepidoptera, and the other tenth of the remaining orders, to wit, 9 Homoptera, 8 Hemiptera, 6 Parasites, 3—6 Poduridæ, 29 highest total. Orthoptera are wanting.

That there are 500 species found there he decidedly does not believe. Most of the species of Coleoptera he found under stones, in turf, all the Staphylinidæ in dung, or under dead birds.

Grubs of some of the Diptera, namely Tipulidæ, and of a few Ichneumons, found on a great variety of flowers.

"Are you aware that in certain seasons in June, certain localities in Iceland are visited by the so-called 'gras-madkr,' or caterpillar plague? Unfortunately, I cannot say with any certainty what the particular atmospheric conditions are, much less what the nature of the caterpillar, or caterpillars is. This is not confined to any particular locality, but seems to be the result of the temperature. I rather fancy that the summer's product of winged insects in these localities afterwards is generally very scant. By the last accounts from Iceland, it seemed probable that the present summer might be a particularly good one, no ice having arrived on the coast at the end of March. But if the ice makes its appearance in April, a deadly summer follows."—(Additional extract from the letter of a native of Iceland, April, 1889).

I may add, in conclusion, that the gentleman from whose letter I have thus twice quoted informed me that he thought he had seen a pale yellow butterfly in his boyhood in Iceland; and also that his wife, in inspecting one of my cabinets, was under the impression that she recognised *Gonepteryx rhamni* and *Colias hyale* again.

Dun Mallard, Cricklewood, May 1st.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

COLIAS EDUSA IN SPRING.—A friend of mine saw a *Colias edusa* flying over the moat at Bramber Castle, in Sussex, on May 6th, 1889.—HAROLD MANN; 9, The Drive, Brighton, May 12th, 1889.

VANESSA ANTIOPA IN SUSSEX.—While driving through Beckley, in East Sussex, on April 29th, I saw a fine specimen of *V. antiopa*, which, although strong on the wing, obligingly rested upon a dry bank, and so enabled me to capture it.—THOS. DAWS; Ewhurst, Sussex, April 30, 1889.

VANESSA ANTIOPA IN KENT.—On May 5th, 1889, I took a female specimen of this insect in the vicarage garden of the Horton Kirby, Dartford.—J. R. HALE; Horton Kirby, Dartford.

VANESSA ANTIOPA IN CAMBRIDGESHIRE.—A specimen of this butterfly was taken by me on May 4th, in a plantation near my house. It showed evidences of hybernation.—PHILIP T. GARDNER; Conington Hall, Cambridgeshire, May 4, 1889.

VARIETIES OF RHOPALOCERA IN HAMPSHIRE.—On July 24th, 1888, whilst staying at Brockenhurst, I took a fine example of the black variety of *Limnitis sibylla*. The normal form occurred in great numbers on the same occasion. On this day also, which was the only really fine one during a fortnight spent in the New Forest, *Argynnis paphia*, var. *valesina*, was by no means uncommon; some dozen specimens in beautiful condition being captured. Two males of *A. paphia* were also taken, with light yellowish spots on the fore-wings, which latter form was, I believe, not very uncommon, for I heard of several other examples being taken.—H. CONQUEST; 1, Mary Villas, Greenleaf Lane, Walthamstow, May 2, 1889.

EREBIA ÆTHIOPS NEAR LONDON.—About the 22nd of July last a friend of mine took a fine specimen of *Erebia æthiops* (*blandina*) in his garden at Brixton. It flew over the wall, and he managed to capture it in a net. As far as I know, there were only two gentlemen breeding *Erebia æthiops* last summer in Brixton, and they are both able to account for all their specimens, so it cannot have escaped from their breeding-cages.—C. A. TEAROE; 14, Ducie Street, Clapham, S.W., March 13, 1889. [The specimen doubtless escaped from captivity in the neighbourhood.—ED.]

LYCÆNA CORYDON, FEMALE VAR.—On September 12th last I captured at Lulworth, Dorsetshire, a female *L. corydon*, the under side of which presented a striking variation from the general type. Instead of the usual brown the ground colour is gray, inclining to white on the four wings. The discoidal spot and the marginal series of compound eye-like spots are present on all four wings; but, besides these, there are only two other spots on each of the hind wings and none on the fore, instead of the usual eleven and nine respectively.—ALFRED T. STIFF; The Laurels, Clapham Common, S.W.

PALE VARIETY OF LYCÆNA BELLARGUS.—When the discussion concerning the pale varieties of *Lycæna bellargus* (*adonis*) was taking place (Entom. xx. pp. 207—209, 220—224, 253—260), I incidentally men-

tioned (p. 207) that the pale variety then under consideration had been previously recorded, but that I could not then find the record. When searching through the back numbers of the 'Entomologist' a short time since, I came accidentally across the record (Entom. ix. p. 253). It is by Mr. Jenner Weir, who quotes M. E. Bellier de Chavignerie, and the note dates back to August 15th, 1847. The note is to the effect that "five *adonis*, which were captured just previous to a violent thunderstorm, were of a beautiful lilac instead of the bright blue of *adonis*;" but those who are interested can easily read the whole of this most interesting note themselves. Suffice it to say that Mr. J. Jenner Weir, although not supporting the view that "electricity" was the agent, inclined to the opinion of the change of colour being due to "moisture;" and this directly supports the opinion of Mr. Briggs (Entom. xx. p. 254), who considered that the cause of these varieties should be sought for directly "in local or phytophagical causes." Considering the light that appears of late to have been thrown on the direct and indirect influence of moisture in the production of certain forms of variation, it is most interesting to find that this record should practically support that view.—J. W. TUTT; Westcombe Park.

OCNERIA DISPAR.—Up to the end of 1888, I have had in my possession a race of this species, which the late Mr. Henry Willits and I have kept for upwards of fourteen years. In 1886 I had fifteen female pupæ, from which I bred one perfect imago, and from the remainder complete or partial cripples (Entom. xix. 282). From five of these crippled specimens I obtained ova, and in 1887 I bred about 100 perfect specimens from those larvæ which I retained for myself, and had only one cripple, a male. I obtained ova from several pairs, and placed a few of these batches in localities around here to try and naturalize them, but if they have fared the same as mine the result will be *nil*. I reserved one batch for myself which emerged on May 13th of this year. The greater part pupated during the last week in August, but on October 21st I had eight larvæ feeding on withered whitethorn, there being no fresh procurable, which have since died, though they were then only about half-grown. I have had but one male out on September 24th. At the beginning of November, though the pupæ were alive, I felt anxious lest a night or two's frost might prove fatal to them, and wishing them to emerge I brought them into a room with a fire. All the pupæ have now died and shrivelled up, though not by any means kept too hot, and I have thus lost a brood which I have reason to believe was of British extraction: I see the late Mr. Buckler, in his 'Larvæ of British Butterflies and Moths,' vol. ii., p. 32, comes to the same conclusion with respect to forcing *Deilephila* when the weather was mild, as I have done with my *Ocneria dispar*, viz., "that I ought not to have begun the forcing till the weather had become dry and frosty, then the heat would have had due effect; but, as it was, the great humidity of the atmosphere had prevented this, and sufficient heat had not reached the pupæ to develop the imagines in them at once." Of course these remarks apply to an insect which in a state of nature remains through the winter in the pupa state, whereas *O. dispar* is in the ova stage; but the same reason holds good for each, and, doubtless, if I had waited for cold weather, I should have succeeded in getting at least a few out, as the pupæ were lively enough till I took them indoors, and twisted around in their cocoons when touched, as noticed by Kirby and Spence in their 'Introduc-

tion to Entomology,' vol. ii. p. 295.—A. E. HALL; Norbury, Sheffield, Dec. 10, 1888.

OCNERIA DISPAR.—Before last summer I had bred many of this insect, with the too general result,—three out of every four, or thereabouts, proved to be “cripples” on emergence. Last summer I bred upwards of 150 larvæ, and tried another plan. I left the pupæ in the places in my inverted bell-glasses, where they spun up and never in any way interfered with or touched them. The result was, that out of over 130 emergences, I had but some half-dozen “cripples.” Whether this is the solution of the difficulty in rearing *O. dispar*, perhaps other readers may endeavour to prove during this coming summer.—(Rev.) J. SEYMOUR ST. JOHN; 42, Castlewood, Road, Stamford Hill, N., March 16, 1889.

PANOLIS PINIPERDA IN IRELAND.—It may interest some of your Irish readers to know that I took two specimens of *Panolis piniperda* at Howth, on the trunks of two Scotch firs, on April 14th. Newman states that it is not reported from Ireland, but I understand that it has been taken at Wicklow since his time. I should like to know any particulars about its occurrence in this country.—GEO. W. HART; 14, Lower Pembroke Street, April 16, 1889.

CARADRINA QUADRIPUNCTATA.—On the 9th of this month a specimen of the above moth was found flying in one of the rooms in this house; it appeared to be very recently emerged. Newman states that the larva passes the winter in its “cubiculum,” and does not change to the pupa stage till May, the moth appearing a few weeks later. It seems fairly certain that in the present case the larva pupated about the middle of the winter, the imago emerging a few weeks later. Probably the larva “made up” in some warm spot, which induced it to undergo its transformations so prematurely. I suppose *C. quadripunctata* has never been known to hibernate in the imago stage? Newman states that the larva feeds on “farinaceous and leguminous crops.” I remember a few years ago, in the autumn, finding a half-grown larva feeding inside a pear: I put the pear, with its occupant, inside a box which was afterwards mislaid. Next summer the box turned up, and it was found that the insect had duly emerged as this species; so that *C. quadripunctata* appears to be a very general feeder, and capable of doing much damage to crops, if present in great numbers.—E. W. H. BLAGG; Greenhill, Cheadle, Staffordshire, March 12, 1889.

AMPHIDASYS BETULARIA, BUFF VAR.—In reply to Mr. Joseph Chappell (Entom. 113) respecting this remarkable variety that was often bred by Middleton collectors, as he says, it would be interesting to know something of their history, and whether the same has been lost. As some entomologists, I understand, believed them to have been manufactured, I will give a short history of them. In 1874, Thomas Lomas and Jonathan Fielding, two members of our local Entomological Society, captured near Heaton Park a buff female *in copula* with a black male. After depositing ova, the female was sold to a London dealer, the ova being taken great care of, and the larva fed up well. Many buff varieties were expected to turn up from this brood that emerged from the pupæ in 1875, but the breeders were disappointed, for not a single buff variety turned up, all being black and ordinary forms. Being thus disappointed, and having no idea the buff forms might reappear, they gave to several collectors virgin females to cross with black males,

which were being bred very freely at this time in Middleton. I was commissioned by the late Henry Doubleday to purchase all black ones that some six or seven collectors were breeding. I understood he sent them on to the Continent. This crossing was so favourable to the re-appearance of the buff variety that no less than seven collectors, who had had virgin females given to them to cross with black males, produced the buff variety in 1876; the proportion being about 10 per cent. Many of these collectors crossed them again with poor success. Lomas and Fielding, who had the greatest number, did not try crossing again, but bred them in and in, and from this breeding no less than 80 per cent. of buff moths turned up in 1877. In these moths of 1877 there was every form of variation, from pure buff to the ordinary type. After that year they gradually grew weaker, and in the course of three years following, the strain was totally lost, and not a single buff variety has been produced since. These varieties were exhibited at the monthly meetings of the Middleton Society in May and June for several years, many of them being alive and in copulation. Any amount of evidence can be obtained from collectors who saw them while being bred and exhibited alive as proof of their genuineness. They were never kept secret, every specimen being shown to any entomologist who wished to see them. Mr. C. S. Gregson, of Liverpool, came several times. After some time a certain London dealer came over very late one Saturday evening; the day following I myself took him to see Fielding's lot of buff varieties. At this time the great bulk were in the hands of Fielding and Lomas. After much persuasion and promise of some extraordinary foreign butterflies for "picture-making," the dealer got every specimen that Fielding had got; but when the case of foreign butterflies arrived, they were not worth the cost of carriage. This so disgusted Fielding that he gave up collecting. Some time after I purchased Lomas' collection, including every specimen of the buff variety he had bred, with the exception of two I had understood he had sold to Mr. Bond. With the exception of two or three specimens in several collections in Middleton, and a few I have given to entomological friends in different parts, including two to the British Museum collection, I possess the whole of what remains of these varieties. This form has not since been bred, and seems to be quite lost.—JOHN THORPE; Middleton, Lancashire, April 23, 1889.

TORTRIX CRATEGANA IN HAMPSHIRE.—I obtained this interesting, and not usually common species, in numbers and in fine condition on the 16th July, 1888, whilst beating for larvæ in Hurst Hill Enclosure, in the New Forest. They were dislodged from the oaks in company with *T. podana*, *T. sorbiana*, and *T. xylosteana*; but *T. cratægana* was on this particular day by far the most plentiful of the species named.—HAROLD CONQUEST; 1, Mary Villas, Greenleaf Lane, Walthamstow, May 2nd, 1889.

SERICORIS URTICANA, VAR. *RUFA*.—Everywhere in Kent the larvæ of *Sericoris urticana* last year appeared to be more than usually abundant, and in June I bred a long series from larvæ obtained in different localities. These were all of a greenish or whitish grey ground colour with one exception, and this satisfied the description in Stainton's 'Manual,' vol. ii. p. 263, where the ground colour is said to be "pale reddish grey." Whilst at Deal in the early part of July, I took a number of larvæ on *Hippophaë rhamnoides*, some of which produced at the end of the month a series of

what are, from the markings, a striking, deep red variety of *S. urticana*. They are somewhat smaller than the other specimens in my series, the ground colour very red, the markings appear darker and more distinct. I think it advisable to put this local form on record and should be pleased to hear if such a form is found in any other locality. Are the moorland forms anything like this?—J. W. TUTT; Westcombe Park.

NEPTICULA MINUSCULELLA.—During 1887 I found a number of mines in the pear leaves. A few moths came out in 1888, and this year six more have now emerged. I may add I could not find a single mine last season. No doubt very few moths came out last year, owing to the wet and cold weather; and possibly the rest remained over for more favourable times, as indicated by my specimens.—J. B. HODGKINSON; Ashton-on-Ribble, April 6.

PSYCHODA CONSPICILLATA IN NEW ZEALAND.—Doubtless some of your readers who make the Diptera their especial study, will be able to throw some light on the following fragmentary observations made during last winter, on the natural history of the above insect. On July 30th I noticed a large number of *Psychoda conspiciata* in a cage containing larvæ of *Agrotis nullifera*. I concluded that they had resulted from a large assemblage of small dipterous larvæ, observed on one of the blades of the speargrass about a month previously. From the uniform size of these larvæ, and the fact that I had not observed them before, I supposed that they had eaten their way out of one of the *A. nullifera* larvæ, but did not notice any remains of the larva. I distinctly recollect, however, that the dipterous larvæ were in one mass when first seen, as if they had all emerged together, but that they afterwards dispersed and buried themselves. On July 31st I examined some of the earth in the cage, and discovered several minute dipterous pupæ, which I isolated in a glass-topped box. These pupæ emerged as *P. conspiciata* on August 8th, at which time the flies were to be seen in great numbers about the houses in Wellington, in the bush and in fact almost everywhere. Hence I feel sure that the insect cannot habitually be a parasite of *Agrotis nullifera*, as the comparative rarity of that insect forbids it, although the above evidence seems to indicate such to be the case. Where, therefore, does *Psychoda conspiciata* generally spend its larval state?—G. V. HUDSON; Wellington, New Zealand, March 19, 1889.

THE COLD SUMMER OF 1888, AND DOUBLE-BROODED MOTHS.—My experience this season hitherto does not coincide with that of your correspondent (Entom. 140). *Selenia bilunaria* has been common in this neighbourhood. I have also seen numbers of *Tephrosia crepuscularia*. Many of the single-brooded Lepidoptera, whose larvæ must have experienced some of the cold of last summer, have been abundant, as *Taniocampa pulverulenta*, *T. gothica*, and *T. stabilis*. I have, however, certainly expected the same results as your correspondent, for in one locality, namely, in Gloucestershire, on the Cotswolds, a frost occurred on one night in July. This must have killed many larvæ, I should imagine, unless their instinct forewarned them of the approaching cold, and they concealed themselves. No doubt in exposed districts and situations they mostly suffered.—T. B. JEFFERYS; Clevedon. [It would be interesting to actually know whether summer frosts do kill lepidopterous larvæ. Those species which hibernate as larvæ are none the worse for being frozen hard and stiff for weeks; but

whether such species have through heredity attained that faculty, while those which are larvæ in summer suffer death from frost, is a fact which has, probably, never been cleared up.—J. T. C.]

LEPIDOPTERA OF SOUTH BUCKINGHAMSHIRE.—In April, 1887 (Entom. xx. 89), I recorded the actual captures of Macro-lepidoptera made by me during the season of 1886 at Chalfont St. Peter. I am now able to give the result of my efforts in the same locality during the following season of 1887, though my hours of hunting were limited. Wishing to complete the list, so far as I am personally concerned, I only state my actual captures, arranged in the same way as in my last contribution, omitting all species there recorded. Besides those I give in the following list, I came upon one specimen of *Tephrosia luridata*, which I unfortunately lost; and on the ledge of a small hut in a wood I found, in a small heap, enough wings of *Stauropus fagi* to make two perfect insects, which had evidently been destroyed by our entomological enemies, the bats. January.—Caught: *Hybernia rupicaprararia* (3). March.—Caught: At willows, *Teniocampa pulverulenta* (5), *T. gothica*, *T. stabilis* (common); at sugar, *Scopelosoma satellitia* (2). April.—Caught: *Anticlea badiata* (4), *Hybernia marginaria*, *Xylocampa areola* (2); at willows, *Teniocampa pulverulenta* (6), *T. gothica* (5), *T. stabilis* (common); at sugar, *Pachnobia rubricosa*. May.—Caught: *Euchloë cardamines* (several), *Pieris rapæ* (common), *P. napi* (3), *Gonepteryx rhamni*, *Argynnis euphrosyne* (4), *Odontopera bidentata*, *Drepana falcataria* v. *pallida*, *Melanippe sociata* (2), *Panagra petrararia* (common); at rest, *Hepialus lupulinus*, *Spilosoma mendica* (female). June.—Caught: *Polyommatus phlæas* (3), *Argynnis euphrosyne* (common), *A. selene*, *Pieris brassicæ* (common), *P. rapæ* (common), *P. napi* (common), *Euchloë cardamines* (common), *Melanippe sociata* (8), *Thera variata* (common), *Syrichthus malvæ*, *Cidaria truncata* v. *perfuscata* (4), *C. corylata*, *Emmelesia affinitata*, *Eupithecia exiguata* (3), *E. castigata*, *Strenia clathrata*, *Cænonympha pamphilus* (common), *Panagra petrararia* (common), *Lomasipilis marginata* (3), *Eurymene dolobraria* (2), *Bapta bimaculata*, *Macaria liturata* (2), *Euclidia mi*, *Hepialus lupulinus* (abundant), *Spilosoma mendica* (2 females), *Cilix glaucata* (2), *Drepana falcataria* and v. *pallida* (7), *Hylophila prasinana* (6), *Euchelia jacobææ* (common). *Agrotis urticæ*; at rest, *Dasychira pudibunda* (2), *Tephrosia crepuscularia* (3). July.—Caught: *Uropteryx sambucaria* (3), *Bapta bimaculata*, *Cidaria picata*, *Thyatira batis*. August.—Caught: *Thecla quercus* (abundant), *Polyommatus phlæas*, *Gonepteryx rhamni*, *Acidalia bisetata* (3), *Cidaria corylata*, *C. immanata*, *Eubolia bipunctaria*, *Dianthæcia carpophaga*, *D. capsicola*; at light, *Strenia clathrata*, *Melanthia ocellata*, *Luperina testacea* (common), *Cerigo matura*, *Eupithecia absynthiata* (2), *Chareas graminis* (3), *Calymnia affinis*; at sugar, *Noctua castanea*; at rest, *Sphinx convolvuli*, *Cirrhædia xerampelina* (21). September.—At rest: *Cirrhædia xerampelina* (8). I was away the greater part of July, and throughout the season "sugar" was almost a failure, the opposite of the previous year.—(Rev.) J. SEYMOUR ST. JOHN; 42, Castlewood Road, Stamford Hill, N., March, 1889.

SUGAR VERSUS BLOSSOMS IN NEW ZEALAND.—Much has been written at various times on the futility of sugaring in the neighbourhood of blossoms, but I think that this axiom should be taken in a far more limited sense than is usually the case. On the evening of February 8th I was collecting in the Botanical Gardens here, the white rata (*Metrosideros*

scandens) being in full bloom at the time, and attracting large numbers of Lepidoptera. I however determined, by way of experiment, to try sugaring in a small wooded gully, less than quarter of a mile distant from the blossoms, and was rewarded by taking a good series of several Noctuæ and Geometræ at the sugar. I should also mention, while on this subject, that I always use rum and honey, which gives out a much more powerful odour than the ordinary sugar: I also apply the mixture at least fifteen minutes after sunset, which I think is a matter of some importance as the bait does not have time to lose its attractive scent before the moths begin to fly.—G. V. HUDSON; Wellington, New Zealand, March 19, 1889.

AUSTRALIAN LEPIDOPTERA.—We hear that the publication of the fine illustrated work on the life-histories of Australian Lepidoptera, of which three parts were published by the late Mr. A. Scott, under the title, 'Australian Lepidoptera and their Transformations,' is to be continued by the Trustees of the Australian Museum, Sydney. The work of editing the valuable material left by Mr. Scott, and of revising the classification and nomenclature of the species, has been entrusted to his daughter Mrs. Edward Forrde and Mr. Sidney Olliff.—Ed.

COLEOPTERA NEAR BIRMINGHAM.—At a recent meeting of the Birmingham Entomological Society, Mr. W. G. Blatch made some interesting remarks on an extraordinary find of Coleoptera near Knowle. On a mossy bank facing the north, about two by three yards, he has taken during a few short visits in March and April, 145 species, including *Amara nitida*, Sturm., *Homalota atomaria*, and many other very rare species. He believes the bank is by no means exhausted yet. The remarks were illustrated by the beetles themselves.—C. J. WAINWRIGHT, Hon. Sec., Birmingham Entom. Soc., April, 1889.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—May 1st, 1889.—Mr. F. Du Cane Godman, M.A., F.R.S., Vice-President, in the chair. Mr. Walter F. H. Blandford, B.A., of Trinity College, Cambridge, and 48, Wimpole Street, W., and Mr. John W. Downing, of 59, Lupus Street, St. George's Square, S.W., were elected Fellows. Mr. W. L. Distant announced the death of Dr. Signoret of Paris, one of the Honorary Fellows of the Society. Dr. Sharp exhibited male and female specimens of an abnormal form of *Rhomborhina japonica*, found in Japan by Mr. G. Lewis. They exhibited a contraction of the thorax, which was much narrower than usual at the base, so that the mesothoracic epimera were entirely exposed. Dr. Sharp also exhibited a small collection of Coleoptera made by Dr. N. Manders in the Shan states, Upper Burmah; this collection contained several new interesting forms, the most remarkable being a small Heteromorous insect bearing a considerable resemblance to *Rhysodes*. Amongst the specimens was an example of *Batocera roylei*, which he had retained in a relaxed condition, so that the Fellows might have an opportunity of hearing its stridulation; this was produced in a very audible manner by passing the base of the prothorax backwards and forwards over a striated space at the base of the scutellum. Mr. C. O. Waterhouse exhibited, for Mr. Frohawk, a series of wings of British Butterflies, prepared in accordance with a process (described by Mr. Waterhouse in the Proc. Ent. Soc.

1887, p. xxiii), by which they were denuded of their scales so as to expose the neururation. Dr. P. B. Mason exhibited cocoons of a species of spider,—*Theridion pallens*, Black.,—from Cannock Chase, distinguished by the presence of large blunt processes on their surface. Mr. H. Goss exhibited, for Mr. N. F. Dobrée, a number of galls of *Coccidæ*, picked off trees of *Acacia melanoxylon* and *Grevillea robusta* growing in the Market Square, Natal. These galls had been referred to Mr. J. W. Douglas, who expressed an opinion that they belonged to the Fam. Brachyscelidæ, and probably to the genus *Brachyscelis*, Schrader. He said that most of the species lived on *Eucalyptus*. Captain H. J. Elwes exhibited a long and varied series of *Terias hecabe*. He remarked that all the specimens which had strongly defined chocolate markings were taken in the cold and dry season, and that those which were without, or almost without, markings, were taken in the hot and wet season. Captain Elwes further observed that he believed that many specimens which had been described as distinct were merely seasonal forms of this variable species. Mr. W. L. Distant, Mr. F. D. Godman, Prof. Meldola, Mr. H. T. Stainton, and Mr. G. Lewis took part in the discussion which ensued. Mr. W. Dannatt exhibited specimens of *Thaumantis howqua*, West, from Shanghai. Mr. H. Burns exhibited, and made remarks on, a number of nests of living ants of the following species, viz., *Formica fusca*, *Lasius alienus*, *L. flavus*, *L. niger*, *Myrmica scabrinodis*, &c. One of the nests contained a queen of *L. flavus* which had been in the exhibitor's possession since September, 1882. Mr. G. C. Bignell communicated a paper entitled "Description of a new species of British Ichneumonidæ." Mr. A. G. Butler communicated a paper entitled "A few words in reply to Mr. Elwes' statements respecting the incorporation of the Zeller Collection with the General Collection of Lepidoptera in the Natural History Museum." Capt. Elwes, Mr. Stainton, Mr. Godman and others took part in the discussion which ensued.—H. Goss and W. W. FOWLER, *Joint Hon. Secs.*

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—*April 25th*, 1889.—T. R. Billups, F.E.S., President, in the chair. Messrs. W. Cant, of Regent's Park, and R. Fortune, of Harrogate, were elected members. Mr. Cooper exhibited a series of *Teniocampa populeti*, bred from a specimen said to have been taken at Rannoch. Mr. Tugwell said that the specimens did not differ from the southern form of the species, and Mr. Carrington remarked that the same form was taken in Yorkshire. Mr. Adye showed a long series of *Asphalia ridens*, from the New Forest. Mr. Fremlin, varieties of *Vanessa urticæ*, picked from 3500 specimens bred by him last season; in some of the specimens the variation was in the shade of colour of the wings, in others in the size of the two spots on the superior wings and in the duplication of the spots, and in many in the absence of the pigment. These last Mr. Fremlin said emerged with crumpled wings, and died within a few hours of doing so. There were also several varieties of *Vanessa io* in Mr. Fremlin's exhibit. Mr. W. West (Greenwich) exhibited the specimen of *Carpocapsa pomonella*, referred to in Mr. Cockerell's note, read at the previous meeting. Mr. T. R. Billups, a large number of British spiders, mounted on card, and he stated that he had very little difficulty in pressing them in this way. Mr. Wilkinson, an example of *Nephula inaurata*, from the Seychelle Islands, but expressed some doubt as to whether the insect was properly named. Mr. Carrington contributed a paper, "British Spiders," which was followed by a discussion.

May 9th.—The President in the chair. Mr. Tugwell exhibited *Tephrosia biundularia*, showing marked variation, including a banded male, all bred from a specimen taken at Tilgate Forest, May, 1888: also bred series of *T. crepuscularia*, spring and summer broods, from the same locality. Mr. Adye, a light form of *Catocala promissa*, the dark band on the hind wings being very indistinct. Mr. Moore, two larvæ of a species of *Sphinx*, from the West Indies. Mr. Adkin, a short series of *Nyssia hispidaria*, from the New Forest, and remarked that it had been fairly common in the Forest. Mr. Watson also exhibited *N. hispidaria*, from West Wickham. Mr. South exhibited a long series of *Noctua brunnea* and *N. dahlia*, *N. festiva* and var. *conflua*, from various localities, and remarked that in 1886 and 1887 he obtained large numbers of the larvæ of *N. brunnea* from North Devon, which were found feeding on bilberry and a species of wood-rush; although the larvæ differed in colour very considerably, yet they were very constant in the markings. He then at some length pointed out the different forms of variation of *brunnea* in his exhibit, and said that in some cases *brunnea* so closely approached *dahlia* that he had a difficulty in saying which was which; and he was of opinion that the relationship between *brunnea* and *dahlia* was something similar to that between *festiva* and *conflua*. Mr. Tutt also exhibited two drawers from his collection, containing the species referred to; and Mr. Adkin, *N. brunnea* and *N. dahlia*, from Sligo, Kent, and other localities. A discussion ensued, Messrs. Tutt, Adkin, Tugwell, Carrington, and others taking part. Mr. Billups exhibited a series of *Bembidium testaceum*, from Chobham; living specimens of *Carabus auratus*, captured in the Borough Market; and a species of Oribatidæ, which he stated was causing an immense amount of mischief to corn-chandlers by feeding on the crushed oats.—H. W. BARKER, *Hon. Sec.*

REVIEW.

Australian Butterflies. By A. SIDNEY OLLIFF, F.E.S., &c. Sydney: Batson & Co. 1889.

Mr. Olliff, whom it will be remembered left this country to take up a position in the Zoological Department of the Australian Museum, Sydney, some time ago communicated to the columns of the 'Sydney Mail' newspaper, a series of popular articles upon the Rhopalocera of that region. These articles have been collected, enlarged, and printed, at the request of the Natural History Society of New South Wales, in book form; with a chapter upon collecting and preserving insects generally. The work, both in the newspaper and now under notice, is extensively illustrated by woodcuts of drawings by Mr. J. M. Cattle. The evident object is to popularise the study of Rhopalocera in Australia, and we can hardly imagine that Mr. Olliff's little work will fail in its intention. There is no systematic list in the book of the species inhabiting Australia, which would have been an advantage, but we gather that material is still wanted for such. On looking through the families there appears to be mentioned nearly 300 species now known, to which number others will doubtless be added from time to time. In point of numbers the Lycænidæ stand first with about eighty species, next Hesperidæ about seventy species, Pierinæ about fifty, Nymphalidæ twenty-five, Papilio's twenty; the remainder being spread over other families and genera in small numbers.—J. T. C.

THE ENTOMOLOGIST.

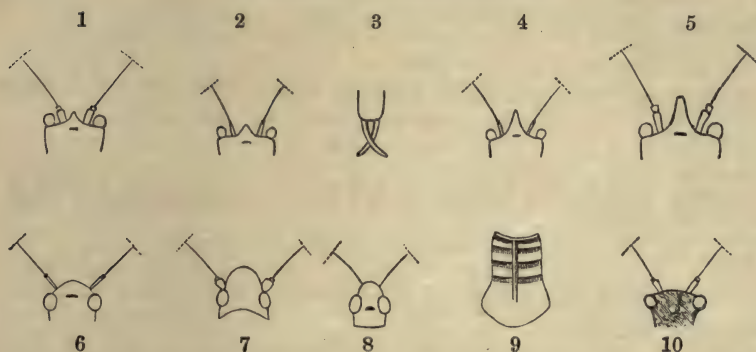
VOL. XXII.]

JULY, 1889.

[No. 314.

BRITISH ORTHOPTERA.

By EDWARD INGLEBY MILLER.



1, head of *Odontura punctatissima*; 2, head of *Meconema varia*; 3, apex of abdomen of *Meconema varia*, ♂; 4, head of *Xiphidium dorsale*; 5, head of *Phasgonura viridissima*; 6, head of *Thamnotrizon cinereus*; 7, head of *Decticus brevipennis*; 8, head of *Stenobothrus parallelus*: all twice magnified. 9, pronotum of *Locusta peregrina*, natural size. 10, head of *Edipoda cerulescens*, twice magnified.

FEW of our British insects have been so much neglected as the Orthoptera, no work having been published since 'British Entomology,' by Curtis (1824—39), and 'Illustrations of British Entomology,' by Stephens (1828—36); this is the more remarkable, as they are both large and handsome, besides being easily preserved and retaining their colours fairly with the exception of the green on many species. The larvæ and pupæ strongly resemble the perfect insects, the latter only having the rudiments of wings, and the former none at all.

Many of these large and beautiful insects are found abundantly in dry meadows, pastures, grassy places, &c., during summer and autumn, where they may be caught in large numbers with a net; some occur upon trees (these latter having long antennæ),

and others in boggy places. They may be killed with carbon disulphide or potassium cyanide, after which they should be pinned through the thorax and set.

There is great confusion in the nomenclature of the families, different authors applying the name Gryllidæ to each of the families composing the Saltatoria, while the term Locustidæ is by some used for those grasshoppers with long antennæ, by others for those with short antennæ; in order to avoid the confusion as much as possible, I have called the first family Achetidæ, and the other two respectively Gryllidæ and Acrididæ.

The most useful works on Orthoptera (besides the two mentioned above) are Fischer's 'Orthoptera Europæa' and Brunner von Wattenwyl's 'Prodromus der Europäischen Orthopteren' (both written in Latin and German).

LIST OF BRITISH ORTHOPTERA.

CURSORIA.		Gryllidæ , Steph., 1829.	<i>lineatus</i> , Panz., 1796.
Blattidæ , Steph., 1829.	ODONTURA , Ramb., 1838.		<i>viridulus</i> , L., 1761.
BLATTA , L., 1766.	<i>punctatissima</i> , Bsc., 1792.		<i>bicolor</i> , Charp., 1825.
<i>lapponica</i> , L., 1745.	<i>standishii</i> .		<i>rufipes</i> , Zett., 1821.
<i>livida</i> , Fab., 1793.	MECONEMA , Serv., 1831.		(<i>Gomphocerus</i> , Thb., 1815).
<i>ericetorum</i> , Wesm., 1838.	<i>varia</i> , Fab., 1793.		<i>biguttatus</i> , Charp.
<i>nigripes</i> , St.	XIPHIIDUM , Serv., 1831.		<i>rufus</i> , L., 1766.
<i>germanica</i> , L., 1766.	<i>fuscum</i> , Fab., 1793.		<i>sibiricus</i> , L., 1766.
PERIPLANETA , Burm., 1839.	<i>dorsale</i> , Latr., 1804.		STETHEOPHYMA , Fisch.
<i>orientalis</i> , L., 1745.	PHASGONURA , Westw.		<i>grossum</i> , L., 1766.
<i>americana</i> , L., 1766.	<i>viridissima</i> , L., 1758.		PEZOTETRIX , Burm., 1839.
PANCHLORA , Burm.	THAMNOTRIZON , Fsch., 1853.		<i>pedestris</i> , L., 1761.
<i>maderæ</i> , Fab.	<i>cinereus</i> , L., 1789.		LOCUSTA , L., 1748.
	DECTICUS , Serv., 1831.		<i>peregrina</i> , Oliv., 1807.
	<i>griseus</i> , Fab., 1793.		PACHYTILUS , Fieb., 1852.
	<i>brevipennis</i> , Charp.		<i>migratorius</i> , L., 1793.
	<i>brachyterus</i> , L., 1745.		<i>flavipes</i> , Don. (Gmel.).
	<i>verrucivorus</i> , L., 1761.		<i>stridulus</i> , L., 1761.
		Acrididæ.	EDIPODA , Burm., 1825.
SALTATORIA.			<i>cærulescens</i> , L., 1764.
Achetidæ , Leach, 1817.			TETRIX , Charp., 1841.
ACHETA , Fab.	STENOBOTHRUS , Fisch.		<i>subulata</i> , L., 1761.
<i>campestris</i> , L., 1764.	(<i>Rhammatocærus</i> , Fisch.)		<i>bipunctata</i> , L., 1761.
<i>domestica</i> , L., 1758.	<i>elegans</i> , Charp., 1825.		
GRYLLOTALPA , Latr., 1807.	<i>parallelus</i> , Zett., 1821.		
<i>vulgaris</i> , Latr., 1807.			
NEMOBIUS , Serv., 1839.			
<i>sylvestris</i> , Fab., 1793.			

TABLE OF FAMILIES.

I. Legs formed for running (Cursoria)	-	-	-	-	BLATTIDÆ.
II. Legs formed for jumping (Saltatoria).					
1. Antennæ long.					
A. Elytra horizontal when in repose	-	-	-	-	ACHETIDÆ.
B. Elytra deflected when in repose	-	-	-	-	GRYLLIDÆ.
2. Antennæ short	-	-	-	-	ACRIDIDÆ.

BLATTIDÆ, Steph., 1829.

= Order **DICTYOPTERA**, Leach.

Eight species. Nocturnal, omnivorous insects, easily distinguished from the other families by their inability to jump and the rapidity of their movements; the larger species (of which our common cockroach is a familiar example) have been

introduced from foreign countries, and are usually found in dwellings, warehouses, &c.; while the smaller species (*Blatta*) occur in woods, under stones, amongst heath, rushes, &c. The eggs are laid all at once enclosed in a capsule.

TABLE OF GENERA.

I. Species smaller	-	-	-	-	BLATTA.
II. Species larger.					
1. Antennæ long	-	-	-	-	PERIPLANETA.
2. Antennæ short	-	-	-	-	PANCHLORA.

1. BLATTA, L., 1766.

= ECTOBIA, Westw., 1840.

These insects differ from *Periplaneta* and *Panchlora* by their smaller size; they occur on herbage, beneath stones, under the bark of trees, &c.; several of the species may be caught by sweeping.

I. Legs yellowish.

1. Species larger. Two distinct dark marks on thorax - *germanica*.
 2. Species smaller - - - - - *livida*.

II. Legs brown or blackish.

1. Species larger. One distinct dark mark on thorax - *lapponica*.
 2. Species smaller.
 A. First joint of hind tarsi pale - - - - *ericetorum*.
 B. Base only of first joint of hind tarsi pale - - *nigripes*.

1. *B. lapponica*, L., 1745. = *nigro-fusca*, De Geer; *sylvestris*, Scop.; *hemiptera*, Fab.—Figures of this species will be found in Curtis's 'British Entomology,' xii. 556; Donovan's 'British Insects,' x. pl. 332; and Staveley's 'British Insects,' pl. iv. fig. 2. Very like *B. ericetorum* and *nigripes*, but larger, and with a distinct, well-defined dark mark on the thorax. Occurs in woods in the South of England from May to July. Rare.

2. *B. livida*, Fab., 1793. = *pallida*, Oliv.—Comparatively shorter and broader than the other species, with the disk of the thorax scarcely, if at all, darker than the ground colour. Found under the bark of trees and beneath stones in the South of England during June and July.

3. *B. ericetorum*, Wesm., 1838. = *germanica*, Panz.; *panzeri*, Hag., Steph.—Strongly resembles *B. nigripes*, but easily distinguished by the colour of the first tarsal joint. Occurs among heath, under stones, in woods, &c., near the coast, and is not uncommon in the South of England from June to August.

4. *B. nigripes*, St. = *ericetorum*, var. ?.—Rather larger and of a more mottled appearance than *B. ericetorum*, of which it is perhaps a variety. Occurs in woods during June.

5. *B. germanica*, L., 1766. = *asiatica*, Pallas.—Figures of this insect will be found in Donovan's 'British Insects,' x. pl. 341; and in Kirby & Spence's 'Introduction to Entomology,' 5th ed. i. pl. ii. fig. 3. Our largest species; easily distinguished

by the two distinct dark marks on the thorax; it is a rare insect, but occurs in various parts of London and other towns with foreign trade, but is always very local, inhabiting particular houses. It is a native of Asia and the east of Europe.

2. PERIPLANETA, Burm., 1839.

= BLATTA, L.; KAKERLAC, Latr.; STELEOPYGA, Fisch.

Easily distinguished from *Panchlora* by the long antennæ.

- I. ♂. Elytra shorter than abdomen. ♀. Elytra very small *orientalis*.
 II. Elytra as long or longer than the abdomen in both sexes *americana*.

1. *P. orientalis*, L., 1745. = *culinaris*, DeGeer. — Not a native of this country, having been introduced from India; it is the common cockroach, so abundant in our houses; also occurring out-of-doors.

2. *P. americana*, L., 1766.—This species is figured in Cuvier's 'Regne Animal,' pl. 77, fig. 4. Larger and handsomer than *P. orientalis*. Very local, but occasionally found in London and other places, where it has been introduced from abroad; it is well-established in many houses, and appears to be gradually spreading.

3. PANCHLORA, Burm.

= BLABERUS, L.?

1. *P. maderæ*, Fab., is the largest of our Blattidæ; it has been occasionally found in London, having been introduced from its native place (Madeira), but is not so well established as *P. orientalis* and *P. americana*.

ACHETIDÆ, Leach, 1817.

= GRYLLIDÆ, Latr.; GRYLLUS-ACHETA, L.; ACHETA, Fab.

Four species. Nocturnal, burrowing insects, easily distinguished from the Gryllidæ and Acrididæ by the horizontal position of the elytra when at rest, and (with the exception of *Nemobius*) the great length of the wings, which are longer than the elytra; they stridulate by rubbing the base of one elytron upon the other. Found in woods, gardens, &c.; one species (*A. domesticus*) occurring in houses.

TABLE OF GENERA.

- I. Elytra much shorter than abdomen.
 1. Very large - - - - - GRYLLOTALPA.
 2. Small - - - - - NEMOBIUS.
 II. Elytra as long as abdomen - - - ACHETA.

1. GRYLLOTALPA, Latr., 1807.

= GRYLLUS (ACHETA), L.

1. *G. vulgaris*, Latr., 1807. = *Gryllotalpa*, L.—Figures of this species will be found in Curtis's 'British Entomology,' x. 456; Donovan's 'British Insects,' v. pl. 147; Cuvier's 'Regne Animal,' pl. 81, fig. 1; &c. This remarkable insect cannot be

confounded with any other, its large size and enormously thick anterior legs distinguishing it at once. Not uncommon in many localities, especially in the South-west of England; it frequents damp places, occurring from April to June, and may be caught by inserting a stem of grass into its burrow, which (being extremely ferocious) it will seize, and can then be pulled out, as it will not leave loose; *A. campestris* can also be captured in this manner.

2. ACHETA, Fab.

= GRILLUS, L.

The insects in this genus may be distinguished from the other Achetidæ by their elytra being as long as the abdomen; they can also be recognised by their size, which is much smaller than *Gryllotalpa*, and much larger than *Nemobius*.

- | | | | | |
|--------------------|---|---|---|---------------------|
| I. Colour blackish | - | - | - | <i>campestris</i> . |
| II. Colour brown | - | - | - | <i>domestica</i> . |

1. *A. campestris*, L., 1764.—This species is figured in Cuvier's 'Regne Animal,' pl. 81, fig. 3. A rare carnivorous insect, haunting hot sandy places; it burrows to the depth of from six to twelve inches; it occurs chiefly in the South-west of England during May, June, and July, and the male chirps very loudly both day and night.

2. *A. domestica*, L., 1758. — Figured in Curtis's 'British Entomology,' vii. 293; Staveley's 'British Insects'; and Cuvier's 'Animal Kingdom' (Griffith), xv. pl. 130, fig. 2. Narrower than *A. campestris*. This is the well-known cricket so often heard in our houses.

3. NEMOBIUS, Serv., 1839.

= ACHETA, Curtis.

1. *N. sylvestris*, Fab., 1793.—The smallest of our Achetidæ; it is a very rare southern insect, occurring in woods during August and September.

GRYLLIDÆ, Steph., 1829.

= GRILLUS-TETTIGONIA, L.; LOCUSTA, Fab.; LOCUSTARIE, Latr.

Ten species. Diurnal insects; distinguished from the Acrididæ by their long antennæ, and by the females having a long exserted ovipositor; they stridulate by rubbing the elytra together. Found in fields, hedges, and upon trees; many species are very local. These insects should not be placed together in confinement, as many of them are very pugnacious, and will kill and devour one another.

TABLE OF GENERA.

I. Elytra very short, less than half the length of abdomen.

1. Thorax short - - - - - ODONTURA.

2. Thorax very long - - - - - THAMNOTRIZON.

II. Elytra more than half as long, but not longer than abdomen.

- | | |
|--|-------------------|
| 1. Antennæ about twice as long as rest of insect | XIPHIDIUM (part). |
| 2. Antennæ not much longer than rest of insect | DECTICUS (part). |

III. Elytra longer than abdomen.

1. Species smaller.

- | | | |
|--------------------|-----------|-------------------|
| A. Elytra brownish | - - - - - | XIPHIDIUM (part). |
| B. Elytra green | - - - - - | MECONEMA. |

2. Species larger.

- | | |
|---|------------------------------|
| A. Front of head (seen from above) rounded. | |
| Eyes not prominent | - - - - - DECTICUS (part). |
| B. Front of head (seen from above) produced into a blunt point. | Eyes prominent - PHASGONURA. |

1. ODONTURA, Ramb., 1838.

= BARBITISTES, Charp.; EPHIPPIGER, Latr.; LEPTOPHYES, Fieb.

Differs from all the other Gryllidæ except *Thamnotrizon* by its short elytra.

I. Elytra brown - - - - - *standishii*.

II. Elytra partly green - - - - - *punctatissima*.

1. *O. punctatissima*, Bosc., 1792. = *autumnalis*, Hag.; *virescens*, Steph.—This insect is green when living, but soon fades to brown after death. Not uncommon; usually found upon the foliage of bushes and trees during August and September. Fig. 1.

2. *O. standishii*.—I am unable to obtain any information of this species, which differs from *O. punctatissima* in the colour of the elytra.

2. MECONEMA, Serv., 1831.

1. *M. varia*, Fab., 1793. = *thalassima*, DeGeer; *nana*, Stoll.; *viridissimus minor*, St.; *arboreus*, Fuessly.—This beautiful insect is figured in Donovan's 'British Insects,' iii. pl. 79, fig. 1. Very common on the foliage of lime and oak trees, feeding upon the leaves; it occurs during August and September, and may be caught by beating the branches. This species does not stridulate. Figs. 2 and 3.

3. XIPHIDIUM, Serv., 1831.

= LOCUSTA, Fab.

I. Elytra longer than the abdomen - - - - - *fuscum*.

II. Elytra shorter than the abdomen - - - - - *dorsale*.

1. *X. fuscum*, Fab., 1793.—Figured by Panzer, 33, fig. 2. This species may be looked for upon herbage and the leaves of trees in damp places; ? indigenous.

2. *X. dorsale*, Latr., 1804. = *dorsalum*, H.-Schæff.; *fusca*, Zett.—Not uncommon in some localities, occurring in damp places during July and August. Fig. 4.

4. PHASGONURA, Westw.

= LOCUSTA, DeGeer, Wat.

1. *P. viridissima*, L., 1758.—This species is figured in Cuvier's 'Regne Animal,' pl. 82, fig. 3; and Donovan figures the larva

and eggs as well as the imago. Easily distinguished by its large size and long unspotted green elytra; it is usually found on trees and bushes, and is not uncommon in many localities during August and September. Omnivorous. Collectors should be careful not to allow this species to bite them (as it will certainly do if they put their fingers too near); it will, however, be an interesting experiment for any one seeking information. This insect is said to be excellent when boiled in water for half-an-hour (having thrown away the head, wings, and legs), then sprinkled with salt and pepper and fried, adding a little butter. Fig. 5.

5. THAMNOTRIZON, Fisch., 1853.

= MICROPTERYX, Steph.; ANISOPTERA, Serv.

1. *T. cinereus*, L., 1789. = *griseo-aptera*, DeGeer; *aptera*, Charp.; *clypeata*, Panz.—Resembles *Odontura* in having extremely short elytra, but may be distinguished from it by the very long thorax; it should be looked for among herbage during September. The males are much rarer than the females. Fig. 6.

6. DECTICUS, Serv., 1831.

= ACRIDA, Curtis.

I. Elytra much longer than the abdomen.

- | | | | | | | | |
|----------------------|---|---|---|---|---|---|-----------------------|
| 1. Colour grey-brown | - | - | - | - | - | - | <i>griseus</i> . |
| 2. Colour green | - | - | - | - | - | - | <i>verrucivorus</i> . |

II. Elytra not longer than the abdomen.

- | | | | | | | | |
|--|---|---|---|---|---|---|-----------------------|
| 1. Thorax with a distinct pale mark on the side;
elytra without any green | - | - | - | - | - | - | <i>brevipennis</i> . |
| 2. Thorax with an indistinct pale mark on the side;
elytra usually partly green | - | - | - | - | - | - | <i>brachypterus</i> . |

1. *D. griseus*, Fab., 1793. = *denticulata*, Panz.; *falcata*, Zett.; *intermedius*, Serv., var.; *krynickyi*, Fisch., var.—Very local and rare, preferring chalky maritime districts; it occurs from July to September.

2. *D. brevipennis*, Charp.—Found amongst herbage, &c., in July and August. Local, but not uncommon. Fig. 7.

3. *D. brachypterus*, L., 1745. = *kirbii*, Dale.—In this species the ovipositor is more than half the length of the abdomen, whereas in *D. brevipennis* it is less. Occurs on herbage from July to September.

4. *D. verrucivorus*, L., 1761. = *binglei*, Curt.—This insect is figured in Curtis's 'British Entomology,' ii. 82. Rare and very local; it occurs during August and September, usually amongst grass near the sea-coast. The Swedish peasants are said to make this insect bite the warts on their hands in order to cure them. *D. verrucivorus* can be distinguished from *Phasgonura* by its more robust form, spotted elytra, and the curved ovipositor of the female (which in *Phasgonura* is nearly straight).

Dulwich Village, S.E., May, 1889.

(To be concluded.)

ON THE VARIATION OF INSECTS.

By T. D. A. COCKERELL.

(Continued from p. 149.)

Class III.—VARIETIES OF SIZE.

Colias edusa major, expanse 57 mill.; *C. edusa minor*, exp. 32 mill. (Entom. xi. 51). *Samia cecropia*, wing-expanse varies from $4\frac{1}{8}$ to $7\frac{1}{4}$ inches (Worthington, Can. Entom. 1876, 166). *Lycæna corydon minor*, confined to one spot near Lewes (A. W. Gush, Entom. xx. 265). *Lycæna icarus minor*, exp. less than 20 mill. (Sabine, Entom. xx. 287). *Spilochalcis maricæ*, Riley, female, varies from 4 to 8 mill. in length, and the male from $3\frac{1}{2}$ to 6 mill., while *Chalcis ovata*, Say, varies from 6 to 3 mill. long (L. O. Howard, Bull 5, U. S. Dept. of Agr. Bureau of Entom. 1885). *Euchloë cardamines minor*, "about half normal size in both sexes" (Ent. Mo. Mag. 1888, 81).—We find that when insects vary in size it is more commonly the case that they become smaller than larger,—that is to say, the influences which act upon the size of an insect are more powerful or more frequent in the direction of dwarfing than in that of adding to the normal growth. The reason of this can be understood if we consider what are the factors in this matter; they are probably three, *nutrition* (quality or amount of food), *length of the period of development*, and *power of assimilation*.

Guyot Daubes, in an admirable paper on "Variations in Human Stature" (translated in 'Popular Science Monthly,' July, 1887), has laid down a general law, which seems also largely applicable to insects. He argues that nutrition is the main thing affecting human stature. In high latitudes the power of assimilation is great, but the food-supply scanty, and this gives rise to a dwarfed race. On the other hand, in hot climates the food-supply may be abundant, but the power of assimilation small, and this again dwarfs stature. But in temperate climates there is a good supply of food, and the conditions are favourable for assimilation; and here we get the maximum of stature. It is to be remembered, though, that recent investigations have shown that tall and dwarf races dwell side by side in equatorial Africa, and I do not know whether the reason of this has been satisfactorily explained.

Now, generally speaking, the power of assimilation, at least of herbivorous insects, is taxed to the utmost: they have all they can eat, and they eat all they can digest; but on the other hand, if the food-supply falls short or dries up, they possess great powers of vitality, and manage to reach the imago stage in the form of dwarfs. This, I think, will explain why we see more dwarfs than giants among Lepidoptera. It will sometimes happen

that, owing to some peculiarities of the season, the number of dwarfed forms observed is unusually great. In 1887 this seems to have been the case in England, and Mr. J. T. Williams (Entom. xx. 288) attributed it, no doubt correctly, to the dryness of the atmosphere and consequent partial drying-up of the food-plants. This is dwarfing due to the *inferior condition* of the food, but in other cases the *quantity* of it has to be considered. Mr. John T. Carrington (*in litt.*) gives a good illustration of this; he writes:—"Some few *Nyssia hispidaria* have been taken in Richmond Park this spring of 1889, but I hear they are small, and so are the *Hybernina leucophæaria*. Last year there was a great plague of larvæ of *Tortrix viridana*, which ate off nearly all the leaves from the oaks, which may account for the small specimens of these two species."

Lepidoptera may be dwarfed in captivity, by giving the larvæ an insufficient supply of food, and it has been stated that these dwarfs are generally of the male sex. Mr. T. G. Gentry (Can. Ent. 1877, 50) believed he could influence the sex of insects in this way, and out of twenty *Samia cecropia* so reared eighteen proved to be males. It would be interesting if all those who possess dwarfed Lepidoptera would examine them and report on the sex.

Some species, as the Chalcididæ quoted above, and species of *Lycæna*, vary much in size when apparently under the same conditions. Mr. W. H. Edwards (Can. Ent. 1876, 203), writing of *Lycæna comyntas*, says:—"I believe that wherever *comyntas* is found, two sizes of the butterfly appear, one scarcely more than half the superficial area of the other. I do not know of any other species in which this peculiarity is regularly found." Mr. J. W. Tutt (Entom. xx. 323) relates that small *Lycæna corydon* occur every year at Dover, and he has found very small *L. icarus* flying together with those of normal size. But here he offers an intelligible explanation, that the dwarfs are those which have been reared on isolated food-plants which were insufficient for their needs.

In insects which have more than one brood in the year, the small size of many vernal broods is quite well known. Presumably this has to do with the length of the period of development, and I have dealt with this subject under "*Seasonal forms*" on pages 27, 28. A curious instance, falling under this head, is given by Mr. C. G. Barrett (Ent. Mo. Mag. 1888, 81) in connection with *Euchloë cardamines* at Haslemere. There occurred a variety about half the normal size, in both sexes, and the males of this variety were invariably the earliest specimens seen, the normal males appearing two or three days later.

Geographical variation in size has been much discussed. Prof. Baird pointed out that birds and mammals tend to decrease

in size southward, and Dr. J. A. Allen has shown that in the eggs of the same species of birds, those in the south are less in number and of smaller size than in the north. Insects, on the other hand, frequently, though not invariably,* increase in size to the southward. These differences appear somewhat anomalous, but remembering that in the Vertebrata an increase of temperature may impair the power of assimilation, while it is not likely to affect insects in this way, at any rate to so great an extent, it is possible to see why size-variation should apparently not follow precisely the same lines in these different classes of animals. Prof. A. S. Packard (Mon. Geom. Moths, pp. 588, 589) has shown that, in North America, Lepidoptera increase in size westward, and this he attributes to the warmer and more humid climate of the Pacific slope. *Drasteria erectea*, a common North-American moth, appears to reach its maximum size in California and its minimum in the Hudson's Bay Territory (see Fourth Rept. U. S. Ent. Com. 1885, p. 352). A. R. Grote (Can. Ent. xii. 17) mentions examples of *Crambus vulgivagellus* and *C. topiarius* from the west which were smaller than eastern specimens, but the first was from a rather northerly locality (Vancouver Island), and the second from a mountainous district (Sierra Nevada), so they are really only exceptions proving the rule.

Insects found on small islands are often undersized, and this may easily be due to want of nutriment. Wollaston states that *Anthonomus ater*, Msh., averages two lines long, but none of those collected on Lundy Island exceed one line, while *Ceuthorhynchus contractus*, Msh., is also small on Lundy. Holme (Trans. Ent. Soc. Lond. ii., pp. 59—62) declares that *Bolitochara assimilis*, Kirby, is invariably smaller in Scilly than near Penzance. But insular faunæ are not always dwarfed, even where one would most expect it. St. Kilda "is very bare, being closely fed down with sheep and cattle, and yet," says Mr. C. W. Dale (Entom. xxii. 13), "I can fully endorse Dr. Sharp's remarks of the specimens [of insects] showing no signs of depauperation." It is worth noting, though, that with three exceptions all the St. Kilda Coleoptera are Geodephaga, and such groups as the Chrysomelidæ and Curculionidæ are (so far as is known) wholly unrepresented. A more curious case is that of the Deserta Grande, one of the Madeira Islands. This island is exceedingly rocky and bare, and I believe closely fed down by rabbits; yet Wollaston records that several species of beetles, such as *Olisthopus maderensis*, Woll., are *larger* there than on the main island of Madeira.

* For instance, *Vanessa urticae* is said to be larger in Scotland than in England (F. A. Walker, Entom. xx. 301).

CONTRIBUTIONS TOWARDS A LIST OF THE VARIETIES OF NOCTUÆ OCCURRING IN THE BRITISH ISLANDS.

By J. W. TUTT, F.E.S.

(Continued from p. 157.)

Cerigo, St., *matura*, Hufn.

Thanks to Herr Hoffman, of Hanover, I have been able to get Hufnägels description of this species from Berlin's 'Magazine,' iii., p. 414. The description is as follows:—" *Phalena matura* (Die Glanzmotte). Anterior wings brownish grey, with white and light yellow markings, which are generally surrounded with brown. Hind wings light yellow, with a broad brown margin." It will at once be seen on looking through a long series of this species, that there are two well-marked extreme forms,—one much marbled with white and red, and with distinct transverse lines and stigmata; the other with these lines and markings very obscured, and the marbling due to the white and red scales almost entirely absent, although these are joined by intermediate forms. Newman, in his 'British Moths,' pp. 295, 296, writes:—"Their colour is various, most commonly bistre-brown of several shades, yet sometimes tinged with brick-dust red, and always having four transverse lines and the two discoidal spots mapped out, or, at least, indicated in pale brown, grey, or white." Guenée, in his 'Noctuelles,' vol. v., p. 179, describes the variegated form under the name of *cytherea*, as also does Fabricius in his 'Entomologia systematica' &c., p. 57, No. 157, where he writes, "*Noctua cristata* alis incumbentibus variegatis, striga alba; posticis flavis, margine fusco." Hübner figures a striking form in his 'Schmetterlinge,' &c., under the name of *connexa*, with the red colour greatly predominating, while Esper's *texta* (pl. 108, fig. 5) represents the most obscure form of this species. Guenée, in his 'Noctuelles,' vol. v., p. 179, remarks:—"One must breed this species if one wishes to have fine specimens, for so fleeting is the colour, that, even on emergence, it appears as if faded." Taking, therefore, the variegated form as the type, I think it advisable to refer simply to the two forms named by Hübner and Esper.

a. connexa, Hb.—Anterior wings with the base reddish brown to the first transverse basal line; between the first and second basal lines a broad black line from the costa to the inner margin. A pale grey line beyond the reniform, beyond which to the hind margin the colour is blackish grey; a wavy, red transverse line runs from costa to inner margin. Hind wings pale yellow, with brown margin and distinct nervures (Hübner's 'Schmetterlinge,' &c., fig. 548).

β. texta, Esp.—Esper, pl. 108, fig. 5, figures a variety of *matura* under this name, of which the following is the description:—"Male. Anterior wings almost unicolorous, dull purplish brown, with a dark streak

parallel to the costa from base to reniform, and two dull basal lines; no orbicular, but distinct reniform; a dull wavy line parallel to hind margin. Hind wings yellowish, with a dull purplish grey hind margin." Although this description would scarcely apply to any of our specimens of *matura*, there is no doubt that Esper had before him an obscurely-marked specimen of this species. I think this name should, therefore, stand for all specimens of the obscure form.

Luperina, Bdv., *luteago*, Hb.

The type of this species does not occur in Britain, but a melanic form from the Irish coast was described as a distinct species by Mr. Doubleday, under the name of *barrettii*, and has been generally placed in the genus *Dianthecia*. Hübner's fig. 184 represents the type of this species, and may be described as:—"Anterior wings of a pale yellowish colour, median nervures reddish, a reddish transverse basal line with another just within the orbicular; the stigmata very pale; a double transverse line just beyond the reniform, and a wavy reddish line parallel to the hind margin; a dark reddish blotch between the second and third transverse lines (under the stigmata), continued up narrowly outside the reniform, and making another blotch on the costa just outside the reniform; hind margin dotted. Hind wings very pale grey, slightly darker on the hind margin." Hübner's *argillacea* is, according to Dr. Staudinger, a var. of this species, whilst Guenée refers Hb.-Geyer's *olbiena* to this species, and Esper figures another form under the name of "*brunneago*." Of the general variation Guenée writes ('Noctuelles,' vol. v., p. 181):—"It varies in colour from a more or less pure and more or less intense yellow to greyish in some specimens." Of the varieties the British *barrettii* is by far the most striking, and this peculiar form is, I believe, unknown on the Continent. *Barrettii* seems first to have been referred to this species by the late Mr. Buckler, who ('Ent. Mo. Mag.,' vol. xvi., p. 55) writes:—"I am constrained to believe *barrettii* to be an isolated and melanic variety of *luteago*." On the same page Mr. McLachlan, in a footnote, writes:—"When last in London, Dr. Staudinger stated to me that, in his opinion, *D. barrettii* is a form of *D. luteago*," and Mr. Dobrée writes:—"My continental specimens of the full-fed larvæ of *luteago* correspond exactly with Mr. Buckler's description of *barrettii* ('Ent. Mo. Mag.,' August, 1879), and anyone who has seen them will recognise that this species has been quite misplaced among the *Diantheciae*" (*in litt.*). "*D. luteago* occurs very rarely in Mecklenburgh, Pomerania, and elsewhere in Central Europe, in Sardinia, Corsica, and is one of the rarest French moths" ('Proceedings of the Royal Irish Academy,' 1884, p. 107).

a. var. *barrettii*, Dbdy.—This variety was first described by Mr. Doubleday, at p. 124 of the 'Entomologist's Annual' for 1864. It is also

fully re-described and figured in Newman's 'British Moths,' pp. 390, 391. There seems to have been a great deal of confusion attending these early specimens, the dark varieties of *consersa*, since added in tolerably large numbers to our cabinets, having been discovered about the same time, and frequently mistaken for them.

The following remarks on the occurrence of this variety in Ireland are interesting:—" *D. barrettii* is now considered to be a remarkable variety of *D. luteago*, a species which occurs rarely in Central Europe. One object I proposed to myself this summer (1884) was the further investigation of this group, *Dianthæcia*. The occurrence of *D. barrettii* only in one very restricted locality at Howth, while its food-plant flourishes luxuriantly everywhere on the littoral, seemed a remarkable anomaly. I was successful in taking it on the coast of Waterford, and, I believe, the larvæ on the Wicklow shores, but unfortunately an accident killed the pupæ before they hatched out. I have no doubt that the insect occurs elsewhere, but its habits are such as to render it very difficult to capture. The divergence of this insect from its original type is so great as to lead to the inference that a vast period must have elapsed since its isolation from the parent stock." (W. F. de V. Kane, in the 'Proceedings of the Royal Irish Academy,' 1884, p. 107.)

β. var. brunneago, Esp.—Esper, vol. iv., pl. 196, fig. 3, represents the type of this variety. This figure may be described as having:—"Anterior wings dull yellow, with several (eight) short, dark red costal streaks; nervures at base dark reddish, with a single arched basal line of the same colour; directly beyond reniform another transverse waved line, at its centre in contact with lower part of reniform; a narrow streak of dull brownish orange colour along the costa, continued a short distance from the apex down the outer margin; median space (between two transverse lines mentioned) extending from costa to inner margin, also dull brownish orange; stigmata dull grey; a small yellowish patch between and under orbicular and reniform; outer margin below apical patch dull yellow; hind margin with a darker line. Hind wings grey, with dark hind margin." His fig. 3, on the same plate, represents a female which has "more orange tint in ground colour, and two transverse orange bands,—one nearer base than orbicular, one just beyond reniform; a curved series of arches of the same colour parallel to hind margin. Hind wings grey, distinct lunule and transverse line, hind margin orange."

γ. olbiena, Hb.-Gey.—Geyer's figure 829 is considered by Guenée to represent a form of this species. It may be described as, "Anterior wings of a deep orange colour, with an abbreviated and complete double basal transverse line outlined in reddish; stigmata also outlined in reddish; two double transverse lines beyond the reniform, the outer one wavy." Geyer's fig. 830 is the under side of 829.

δ. var. argillacea, Hb.—According to Dr. Staudinger, Hübner's *argillacea* is a variety of *luteago*. This variety, represented by Hübner's fig. 590, may be described as:—"♂. Anterior wings having the ground colour bright yellow, tinted slightly with orange, and much clouded with grey atoms; the

two transverse basal lines stand out distinctly in the clear ground colour; stigmata clear yellow; a broad shade of the same colour from near the apex to the inner margin; the central area above, below and around the stigmata grey with a greenish tinge, the outer margin of wing also greenish grey with a fine wavy line passing through it parallel to hind margin. Hind wings very dark grey, base paler."

Luperina, Bdv., *dumerilii*, Dup.

Of this very distinct *Luperina* six specimens are supposed to have been captured in Britain; see 'Entomologist,' vol. xviii., pp. 73, 74, and Newman's 'British Moths,'* pp. 296, 297. I have seen none of the British specimens, but amongst the continental ones I have looked through there appears to be a great deal of difference in the intensity of the markings. The type has distinct markings and pale stigmata, both males and females, but the females are rather darker than the males. Some specimens are, however, almost unicolorous, although the markings are traceable. Dr. Staudinger treats these dark specimens as Boisduval's *desyllesi*. The following note I made some time ago of the specimens in the continental Doubleday collection at the Bethnal Green Museum:—" *Dumerilii* is very distinct from any other species. The females are darker than the males; the males have whitish stigmata, and so has one female; the other two females are more unicolorous, and have the stigmata indistinct."

Var. *desyllesi*, Bdv.—This is treated by Guenée as a distinct species, but Dr. Staudinger treats it as a var. of *dumerilii*, a view I believe now accepted by most continental Lepidopterists. Staudinger says of it, "Al. ant. fere unicolor." Guenée, in his 'Noctuelles,' vol. v., p. 183, gives a very complete description. He writes:—"Superior wings of a grey-brown, with the two median lines slender, blackish, margined exteriorly with a fine yellowish line. No claviform stigma (at least in the one I describe from). Ordinary stigmata distinct, of a yellowish white, with a grey-brown centre. Subterminal line of a yellowish white, *straight*, but continued so as to touch the two edges of the wing. Terminal space not much darker than the ground colour. Inferior wings white in both sexes, with a greyish margin; all four wings white beneath, with an angulated grey line near the outer margin." Guenée mentions, too, only "two examples."

(To be continued.)

SPRING BUTTERFLIES AT HYÈRES.

BY FRANK B. NORRIS.

A SHORT list of butterfly captures this spring may prove of interest to some of your readers. The lovely scenery about Hyères and its islands is well known, and contributes not a little to the charm of collecting in these favoured parts; whilst the

* This latter record is not quite correct in its particulars; vide Entom. xviii., p. 74.

geology of the district is varied and somewhat peculiar, and affords a rich harvest of rarities to the botanist. April was, on the whole, a fine month, but more than usually marred by that fierce, dry wind, the "mistral" (N.W.), with the provokingly cloudless sky that accompanies it, as a rule; whilst it blows, no insect stirs in the open, and the collector's only chance is to seek some of the very sheltered gorges that run up into the surrounding hills. May opened with a fortnight's dull, cloudy, thundery weather, and but little sunshine, or most likely the following list would have been added to considerably.

Papilio sinon, was common in April, revelling in the warmth of rocky hill-sides, where five or six might sometimes be seen together, and early in the month it seemed partial to plum and almond blossom; first seen, April 4th, and onwards through May. *P. machaon*, appeared in sheltered spots and gardens about April 6th, and was less numerous than the preceding.

Thais polyxena, var. *cassandra*, occurred here and there in the plain, by the sides of streams and wet ditches, but occasionally at a slightly higher elevation by small rivulets, on the banks of which its food-plant, the *Aristolochia rotunda*, grows plentifully; some specimens approached the type very nearly; I have been told the variety, usually taken here, is that called *ochrea*; first seen, April 6th, and throughout the month. *T. rumina*, var. *medesicaste*, is a much scarcer insect usually, and occurs as a rule singly, in dry, warm, sheltered slopes, where the *Aristolochia pistolochia* (by no means a common plant), its caterpillar's food-plant, grows; on May 3rd the writer was fortunate enough to find this butterfly in profusion; some specimens exhibited an almost total suppression of red markings on the fore wing; first seen, April 13th, and it occurred up to May 24th.

Aporia crataegi, common; first seen, May 7th.

Pieris brassicae, *P. rapae*, and *P. napi* were all very common. *P. daphidice* was fairly common all April, chiefly in the plain, at the flowers of Cruciferae, such as *Biscutella*; at Bordighera it was common from the beginning of February; var. *bellidice* was rare.

Euchloë belia, was locally common on cistus-covered slopes; its habit of flight reminds one of *Colias edusa*; first captured, April 2nd, thence onward through April and May. *E. cardamines*, common in pine woods from April 13th, females being a little later than males in appearance. *E. eupheno*, var. *euphenoides*, in same situations as last, and from same date; it is easily captured, often settling on crucifers; females later and scarcer.

Leucophasia sinapis, appeared first, April 18th, in open spaces in woods; aberration *erysimi*, occasionally in May; and aberration *lathyri*, now and then.

Colias edusa, was common throughout April and May, flying over wheat-fields and sainfoin; var. *helice*, sparingly.

Gonopteryx cleopatra, very common; April and May.

Thecla rubi, abundant in and near woods.

Thestor ballus, locally common where wild thyme abounds, on sheltered southern slopes, settling on the flowers or on leaves, or the ground; it occurred all through April.

Polyommatus alciphron, var. *gordius*, taken here and there in small numbers on dry, warm, stony slopes; the males are much suffused with blue; May 10th and onwards. *P. phlæas*, common on sunny banks.

Lycæna ægon, occurred very sparingly on the sea-shore, near La Plage; first seen, May 20th. *L. baton*, first seen, April 5th; locally common, frequenting thyme flowers in old quarries; var. *panoptes*, also common locally. *L. astrarche*, not very common; first seen, April 22nd. *L. icarus*, dark in colour, fairly common over sainfoin and meadows. *L. corydon*, occurred sparingly on lavender flowers and by road-sides; first taken, May 19th. *L. argiolus*, common all April over shrubby growth on hills. *L. sebrus*, single specimens here and there, commoner at Montrieux near Hyères, and Mount Coudon at beginning of May. *L. semiargus*, was also very scarce. *L. minimus*, common locally, as at Mount Coudon, May 12th. *L. cyllarus*, fairly abundant from beginning of May; specimens of males and females occurred without ocelli on under side of hind wings. *L. melanops*, first taken, April 14th; very local on cytisus and other shrubs on southern slopes; females ten days later.

Nemeobius lucina, occurred at beginning of May, sparingly, at Montrieux, near Hyères.

Libythea celtis, seen two or three times; a rarity in these parts.

Charaxes jasius, occurred in the larva state on arbutus at the beginning of April. Mr. Kane, in his usually excellent 'Handbook of European Butterflies,' says, p. 54, "the chief emergence is in first half of May"; this is the case in the breeding-cage, but not under natural conditions. Resident collectors at Hyères tell me that it very rarely, if ever, occurs in the open until the first week in June. I mention this, as Mr. Kane's statement is misleading to some extent.

Apatura ilia, aberration *chlytie*, occurred sparingly round poplars at Montrieux, near Hyères, about May 19th.

Limenitis camilla, first captured, April 27th; was fairly common in sunny glades in woods, and by hedgerows; some specimens were very large.

Vanessa egea, was only seen twice; it is very rare at Hyères, but common at several places on the Eastern Riviera. *V. polychloros* and *V. c-album*, pretty common here and there. *V. urticae*, very rarely seen. *V. io*, common; *V. antiopa*, also common; as were *V. atalanta* and *V. cardui*.

Melitæa aurinia, var. *provincialis*, the peculiar form found here, common, but very local; settling on the handsome yellow flowers of the *Linum companulatum*; April 28th, &c. *M. didyma*, of unusually deep colour: occurring fairly abundantly in valleys from May 10th; some females of this species had very dark fore wings, reminding one strongly in colour of *A. paphia*, var. *valesina*, the hind wings in these specimens being as type. *M. cinxia*, the commonest butterfly here; first seen, April 7th. *M. phæbe*, also abundant, but more local than last insect. *M. parthenie*, very local in warm valleys; first seen, May 20th.

Argynnis latona, appeared here and there from April 2nd. *A. euphrosyne*, was of very large size and rich colour; some specimens measured nearly $2\frac{1}{4}$ inches in expanse; first taken, April 27th. *A. dia*, occurred sparingly from end of April.

Melanargia syllius, taken commonly, but locally, from May 12th; specimens occurred over $2\frac{1}{4}$ inches in expanse; flies over grass slopes, and settles frequently.

Pararge mæra, here and there over rocky dry water-courses in the mountains, from May 15th. *P. megæra*, common everywhere. *P. egeria*, common in shady lanes, and among foliage. They were all of the southern type of colour.

Epinephele ianira, males were common from May 15th; specimens were very large. *E. pasiphaë*, on hill-sides; common locally.

Cænonympha pamphilus, common everywhere.

Spilothyrus alceæ, was fairly common in warm dry nooks all April.

Syrichthys sida, very local; occurred in clearings in woods here and there in small numbers; flies rather late in afternoon. *S. malvæ*, abundant. *S. orbifer*, occurs sparingly in May. *S. sao*, fairly common over flowers of lavender and thyme.

Nisoniades tages, common in stony valleys near sea.

I was disappointed in not meeting with the tailed blues, *L. telicanus* and *L. bætica*, and others that should have been out; but, as I have said, the season was not very propitious.

Hyères, May 24, 1889. (20, Courtfield Gardens, Earl's Court, W.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

SPRING RHOPALOCERA.—It will be encouraging to beginners to know that I have, this season, taken no less than twenty-four species of butterflies up to the 15th of June, in one locality in Surrey. Most of them were comparatively abundant.—JOHN T. CARRINGTON.

COLIAS EDUSA IN WALES.—I saw a specimen of *Colias edusa*, a male, I believe, on the wing this morning, a few miles from here. It will be interesting to notice whether we are at last going to have a "clouded yellow year," though I presume the one I saw had hybernated.—W. E. R. ALLEN; Porthkerry Rectory, Cowbridge, S. Wales, June 13, 1889.

SCARCITY OF THECLA W-ALBUM.—It does not seem to be a good year for *Thecla w-album*, as I have only taken one or two of the larvæ and pupæ in places where last year I took several dozen.—W. E. R. ALLEN; Porthkerry Rectory, Cowbridge, S. Wales, June 13, 1889.

VANESSA MILBERTII.—I have to-day taken an example of *V. milbertii* here, at West Cliff, flying on a dry sunny bank near a swamp, where *V. antiopa* and *Pyrameis cardui* were also on the wing. It is a variety, which I will call *subpallida*, characterised by the broad reddish fulvous band on the upper side being, at its upper extremity and for a considerable area about its middle, of a pale yellowish colour. Prof. French ('Butt. Eastern United States,' p. 195) has also recorded this form from Colorado, for he says, "one example from Colorado has fully half the pale band buff." This is very interesting, because it is one of those pale forms produced in the arid region, where we see that as moisture causes darkening, so dryness tends to bleach; and this is so noteworthy in parts of Arizona and Mexico as to give a special character to mammals, birds, and insects alike. Lately I have found *Aphodius vittatus* here in considerable plenty; and although

this species presents a black variety, all the West Cliff examples are of the form that has patches of red on the elytra, like the *Aphodius plagiatu*s on the continent of Europe.—T. D. A. COCKERELL; West Cliff, Custer Co., Colorado, May 19, 1889.

CANNIBALISM OF *ARCTIA CAIA*.—A short time ago I took several larvæ of *Abraxas grossulariata* and also a larva of *Arctia caia*, and I put them together in one cage. This morning I saw that the larva of *A. caia* had attacked one of the *grossulariata*. Examining it more closely I found that it was eating the *grossulariata*. There was plenty of food in the cage, so that that was no reason why it should turn cannibal.—HUGH JACKSON; Houghton, 9, The Drive, Brighton, June 5, 1889.

OCNERIA DISPAR.—I have bred *Ocneria dispar* for many years from the egg. In the open air they proved a failure,—every caterpillar died. I next tried them on a high kitchen-shelf, a couple of yards to the right of the fire-place, feeding the larvæ on whitethorn. My plan, which I follow in all hatching operations, was to place the eggs in a small Liebig's Extract of Meat jar, covering with a piece of muslin, and fastening the latter with an elastic-band. I then placed on the top of the jar a small square of glass, and lifted it occasionally to admit air. The glass prevented the food from drying. As soon as possible the larvæ were transferred to a good-sized flower-pot covered with muslin, but without the glass, and, when the size of the caterpillars allowed, a covering of net was substituted for the muslin. The food, after dispensing with the glass, required to be renewed two or three times a day. The loose withered leaves were allowed to remain in the pot, and upon these the pupæ formed without web or cocoon. The moths emerged in about a fortnight, pupa after pupa to the very last one; and I well remember what a lively lot the males always were. The specimens in my cabinet measure as follows:—Males, nearly 2 inches from tip to tip; females, nearly 2½ inches. I cannot remember ever breeding a single cripple.—J. ARKLE; 2, George Street, Chester, June 3, 1889.

AGLIA TAU.—I encountered this insect under somewhat different circumstances to those described by Mr. Swinton (Entom. 139), while at Wiesbaden, last year. There, undoubtedly, *Aglia tau* preferred the shade of the trees in the extensive elevated woods of the district. They began to appear precisely with the unfolding of the beech leaves, in the spring. I observed them first on the 2nd of May. They continued abundant throughout the month, the males flying in the heat of the day, darting in and out among the trees in search of the females, and were by no means easy to net; one rarely saw them on the wing except during sunshine. The females I took on two or three occasions, flying just before dusk. I also took several of these at rest on beech trunks during the day, and once a pair in copulâ in the same situation. The females laid freely in captivity. The eggs are large, reddish brown, and somewhat oval in shape, with a slightly corrugated surface. The larvæ hatching from these are very beautiful, being pale green, with a few long branched spines of a pink colour. All mine accidentally perished at this stage, but I met with the full-grown larva in August crawling down the beech trunks; it is then quite different, being dull green, with no spines, but covered with short bristles, which give it a roughened appearance, and tapering towards the head and tail. I searched, but unsuccessfully, for the pupa about the roots

of trees the following October.—R. M. PRIDEAUX; Woburn Place, W.C., June, 1889.

ACRONYCTA ALNI NEAR YORK.—Whilst entomologising at Askham Bog, near York, on the 13th instant, I netted a fine imago of *Acronycta alni*. It was hovering above my head among birch.—E. G. POTTER; 19, Price Street, York, June 17, 1889.

CARADRINA QUADRIPUNCTATA, HYBERNATING.—With regard to Mr. Blagg's note on *C. quadripunctata* (*cubicularis*), *ante*, p. 162, it has opened up a question about which, I suppose, few lepidopterists could give a satisfactory answer, *viz.*, How does this species pass the winter? My experience is that it is in the imago state. It can be obtained throughout the winter in the stacks of hop-bine, so frequent in Kent, and occasionally from thatch. An Aberdeen lepidopterist wrote to me only this winter about finding an imago in January or February, and asked me whether it was unusual. I had no hesitation in answering in the negative. The specimens obtained in the winter months are in equally good condition with those obtained in the summer, and it suggests itself whether the larvæ from the summer brood feed up and emerge normally in late autumn and then hibernate; certain it is that a part of the brood must generally do so. I see Merrin's 'Calendar' gives the date of the imago as May to October. Facts would lead one to substitute May to May, for I believe that good specimens can be obtained every month in the year.—J. W. TUTT; Rayleigh Villa, Westcombe Park, S.E.

AGROTIS CINEREA.—On the 6th of June I took a fine male specimen of *Agrotis cinerea* from a lamp-post near here; and on the evening of the 9th I took a fine variety of the same insect, with the outer half of the wings dark, from a lamp-post at Polegate.—H. G. PLACE; 53, Buckingham Road, Brighton, June 13, 1889.

FOOD OF NYSSIA ZONARIA.—In 1882 I had a few larvæ of *Nyssia zonaria* given to me, with instructions to feed them on yarrow (*Achillea millefolium*). Accordingly I procured some well-seasoned leaves of this plant, with which the larvæ were supplied, but to my sorrow they refused to feed upon it, and in the course of a week pined away and died. Was it the journey that sickened them? or was it improper food? With regard to the food-plant, the following may be of interest. Whilst collecting on the Conway sand-hills, near the Penmaenmwr rocks, on June 18th, 1885, I discovered the larvæ of *N. zonaria* in abundance, feeding upon bird's-foot trefoil (*Lotus corniculatus*). To make sure that they were feeding upon this plant, some turf was cut, which contained both yarrow and trefoil. Upon this the larvæ were placed, and the result was that they ate every leaf of the latter, but left the yarrow standing untouched. The larvæ were then supplied entirely with bird's-foot trefoil, upon which they thrived most remarkably. I should add that the plants selected for food were obtained from the coast, or from well-exposed situations; coarse, rank foliage was never given them. I believe *N. zonaria* will also feed upon *Centaurea nigra*, but I have never tried it.—R. NEWSTEAD; Curator, Grosvenor Museum, Chester, May, 1889.

HYPSIPETES RUBERATA IN ABERDEENSHIRE.—My wife took a very fine dark form of this moth at rest on the staircase of our house on May 20th,

1889, and I netted a few myself in the first week of June, flying at birch trees. I have never heard of its being recorded from Aberdeen before.—L. G. ESSON; 46, North Charlotte Street, Aberdeen, N.B. [This species usually frequents sallow or willow, and flies late at night.—ED.]

PSEUDO-MELANISM.—Dr. T. A. Chapman first drew my attention to the fact that certain species of Noctuæ appear to be melanic when worn. *Acronycta psi*, apart from the fact that there are dark varieties, exhibits this apparently melanic tendency, specimens of the pale form appearing much darker when they begin to be worn. *Leucania conigera* and *Teniscampa miniosa* exhibit this peculiarity in a very marked degree: *Oporina croceago*, also, to a less extent. I have noticed the same tendency in *Mamestra sordida*, *Hecatera serena*, and *Aplecta nebulosa*. It would be interesting to know what other species exhibit this tendency.—J. W. TUTT; Westcombe Park, S.E.

EXTRACTION OF MOTH FROM PUPA.—Last year I had about a dozen pupæ of *Dicranura vinula*, and in May most of them had emerged; but one, though it had already made a small perforation in the cocoon, seemed from some cause unable to make its escape. Having waited for a day, and seeing that the insect still remained the same, I carefully peeled off a small portion of the cocoon, taking especial care not to injure the enclosed insect. The imago then crawled out, but its wings never expanded, although there is no doubt but that the experiment was made at the right time. It seems that assisting moths to emerge is more likely to result in cripples than to prove successful.—H. D. SYKES; "The Cedars," Enfield, May 13, 1889.

[There would seem to be as much evidence that the moth was imperfect originally, and that this caused non-emergence, as that the assistance was the cause of crippling. Perhaps the pupa was kept too dry.—ED.]

THE YELLOW TINGE OF SOME NEWLY-EMERGED MOTHS.—Mr. F. W. Paple has some interesting remarks in the December No. of 'Science Gossip,' 1888, relative to the yellow tinge of newly-emerged examples of *Leucoma salicis*, which he attributes to "the fluids contained in the wings not being completely absorbed." In this connection I may mention that I bred some specimens of *Gnophala vermiculata* from larvæ found here on *Mertensia*, and on July 4th took note of a freshly-emerged example. The white portions of the wings were decidedly tinged with yellow, tending to primrose, while the white lateral marks on the body were without any of the yellow tinge. Probably this yellow tinge is observable in other white Bombycid moths on emergence, but it seems not to have been generally noticed.—T. D. A. COCKERELL; West Cliff, Colorado.

THE DESTRUCTION OF LEPIDOPTEROUS LARVÆ BY SUMMER FROSTS.—With regard to this question (Entom. 164), I should have imagined that larvæ accustomed to a warm temperature generally, would be liable to be destroyed by a sudden fall to the freezing-point, in the same way that plants of differ kinds suffer. Some of the imagines perish from the same causes. Newman observes of the males of *Cidaria miata*, "it is presumed he perishes with the early frosts." Köllar on 'Insects Injurious to Gardeners,' &c., observes in the chapter, "Means of Defence against Noxious Insects":—"Late frosts are also very beneficial, as they entirely destroy many insects in their larva state. I had an opportunity, early in the summer of 1833,

of observing great devastations on the fir trees in the neighbourhood of Vienna by a species of sawfly (*Tenthredo rufa*, Klug.) . . . Fortunately, in the month of May, a moderate frost set in, and thousands of the larvæ were seen hanging to the twigs, scorched." Kirby and Spence, it will be remembered, has the following, on "the subject of Hybernation":—"Many insects, though able to sustain a degree of cold sufficient to induce torpidity, would be destroyed by the freezing temperature, to avoid which they penetrate into the ground, or hide themselves under non-conducting substances; and there can be little doubt that it is with this view that so many species, while pupæ, are thus secured from cold by cocoons of silk or other materials." The case of some hybernating larvæ I take to be somewhat different, according to the editorial remarks: they have without doubt "inherited" the power, originally given them, of hybernating from some peculiar state of their formation. Is it not the case that other hybernating larvæ, those which conceal themselves, are liable to destruction by frosts, when they have been tempted forth by unusually mild weather very early in the season? It is well known how sensitive Lepidoptera are to changes of temperature. Might not some of their larvæ escape the effects of summer frosts by concealing themselves; whilst others, which had not taken sufficient protection, be destroyed?—T. B. JEFFERYS; Clevedon, June 10, 1889.

MIGRATION OF LEPIDOPTERA.—Previous to the 1st of June I had not seen a single hybernated *Vanessa cardui* nor one *Plusia gamma* in Surrey, where I have collected several times weekly since the season opened. On that day one *V. cardui* was captured, but on the 3rd of June *V. cardui* was abundant, in fact hundreds were seen, as were *P. gamma*. Both species gradually disappeared during the week, and were afterwards only occasionally to be observed. There had been a steady south-east wind for the three days before June 1st.—JOHN T. CARRINGTON.

MIGRATION OF DRAGONFLIES.—In a note recently received from Mr. H. Gätke, of Heligoland, he says, "Have you had any arrival of dragonflies, *Libellula quadripunctata*? Here, on May 21st and 22nd, they swarmed by the million, and continued to the 26th, when the wind became northerly, and next morning not a single one was to be seen." It will be interesting to learn if any have been observed on our east coast, or on the light-vessels in the North Sea.—JOHN CORDEAUX; Great Cotes, Ulceby, June 1, 1889.

SPRING INSECTS IN MIDDLESEX.—In reference to the month that ends to-day, the earlier appearance of insects this season as compared with last will no doubt be remarked on. The earliest date at which I noticed Neuroptera, Agrionidæ, and *Libellula depressa* was May 19th, about Belmont and Canons Wood Park, between Harrow and Stanmore. Up to May 25th Diptera were very abundant, and *Empis tessellata* notably so. What a number of other common species—as the blue-bottle, dungfly, daddy long-legs, &c.—fall victims to this insect. The cold and wet of the last four or five days has materially diminished the number of insects generally. The genera *Eristalis* and *Syrphus* have been well represented; *Bibio marci* and *Leptis scolopaceus* have likewise been observed, but are not common. Respecting Hymenoptera, I have seen very few wasps as yet, far fewer than last year. The fact that I captured fully twenty females last spring, thereby preventing twenty nests, may have had something to do with their comparative rarity at Cricklewood this season. Bombi, again,

are not more plentiful this year, though I have not observed them so carefully, having got a set of all that I have seen in this neighbourhood. Smaller genera, *Andrena* and *Osmia*, the former of the two being particularly abundant, have been captured on the blossoms of the pear, plum, &c. Among Ichneumonidæ, *Lampronota bellator*? continues, as previously, common. Our local Rhopalocera are very few in number, and of the commonest. I have been enabled to add *Gonepteryx rhamni* to the local list. Coleoptera, Hemiptera, and Orthoptera, here, are few and far between. With regard to the Coleoptera, the soil no doubt has a great deal to do with it. I rarely succeed in augmenting the catalogue of these groups. This is the first season that I have seen *Sialis lutarius* at all plentiful. Many fall into the ponds, and are only extricated with their smoky-coloured wings too limp and draggled to admit of effective setting out. *Panorpa germanica* occurs here, but very sparingly. If I had taken pains with the Heterocera, I might have drawn up a more numerous list, but I rarely meddle with the Micros, as I am sure to damage them, either in killing or setting out. I have added four species of Hymenoptera to the list within the last week or two.—F. A. WALKER; Dun Mallard, Cricklewood, May 31.

HESSIAN FLY.—The first Hessian fly specimens for 1889 came to hand this morning, in the larval state, and apparently full grown. They were on the small under shoots of wheat, which plant is just coming into ear. They were from Revell's Hall, near Hertford, and are sent me by Mr. G. Palmer, who first noticed the fly in England.—ELEANOR A. ORMEROD; Torrington House, St. Albans, June 14, 1889.

COLORADO HYMENOPTERA.—*Agama glabella*, alluded to Entom. xxi. 301, is by no means an ichneumon, as there stated, but is a species of Mutillidæ, having a superficial resemblance to the ichneumons. The species is, perhaps, better classed as *Photopsis glabrella*; while a second species from Cottonwood Springs, Pueblo Co., has been identified by Mr. W. H. Ashmead as *P. ampla*, Blake. Mr. Ashmead also identified *Polistes variatus*, Cress., from the same locality; and the "*Sirex*" preyed upon by *Thalessa* (p. 302) proves to be a *Tremex*, at first considered a new species (*T. hospes*), but now referred by Prof. Riley to a new western race of *T. columba*, L. The Mutillidæ are quite numerous in Colorado, species of *Sphærophthalma* being very noticeable, running over the ground in dry sunny spots; while *Photopsis* comes very numerous to light, so as to be quite a nuisance.—T. D. A. COCKERELL; West Cliff, Colorado, May 2, 1889.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—June 5th, 1889.—The Right Honourable Lord Walsingham, M.A., F.R.S., President, in the chair. Mr. W. M. Christy, of Watergate, Emsworth, was elected a Fellow; and Mr. W. F. Blandford and Mr. C. Cave were admitted into the Society. Mr. S. Stevens exhibited a specimen of *Acrolepia assectella*, Zeller, included in a lot of Tineidæ purchased by him at the sale of the late Mr. A. F. Sheppard's collection, and determined by Mr. Stainton. He also exhibited, for comparison, a specimen of *A. betulella*. Mr. J. J. Walker, R.N., exhibited a collection of Lepidoptera made in 1887 and 1888 in the

immediate vicinity of the Straits of Gibraltar. The collection included sixty-eight species of butterflies, of which thirty-six were obtained on the Rock of Gibraltar itself, and the remainder on the European side of the Straits, and about 160 species of moths. Dr. P. B. Mason exhibited a number of specimens of a South-European species of Ant—*Crematogaster scutellaris*, Oliv. He said that the specimens were all taken in the fernery of Mr. Baxter, of Burton-on-Trent, and had probably been imported with cork. Mr. O. E. Janson exhibited a pair of *Neptunides stanleyi*, a species of Cetoniidæ, recently received from Central Africa, and described by him in the February number of the 'Entomologist'; also some varieties of *N. polychrous*, Thoms., from the Zanzibar district. Dr. N. Manders exhibited a number of Lepidoptera collected by himself in the Shan States, Upper Burmah; also a collection of Lepidoptera made by Captain Raikes in Kárenni. Mr. M'Lachlan exhibited over 400 specimens of Neuroptera, being a portion of the collection formed in Japan by Mr. H. J. S. Pryer. They represented nearly all groups (excepting *Odonata*, now in the hands of Baron De Selys). Some of the Ascalaphidæ, Panorpidæ, and especially Trichoptera, were of great beauty; notably amongst the latter was the curious moth-like genus *Perissoneura*, M'Lach. Dr. Sharp exhibited the peculiar cocoons of an Indian moth, *Rhodia newara*, Moore; these were the cocoons possessing a drain at the bottom in order to allow water to escape, already described in the 'Proceedings of the Zoological Society' for 1888, p. 120, where, however, their great resemblance to the pods of a plant had not been alluded to. Mr. Enock exhibited, and made remarks on, specimens of *Cecidomyia destructor*, bred from American wheat. Mr. W. Warren exhibited a bred specimen of *Retinia posticana*, Zett., from Newmarket; also specimens of *Eupithecia jasionæata* and *Gelechia confinis*, bred by Mr. Gardner, of Hartlepool. Mr. C. O. Waterhouse exhibited and explained a number of diagrams illustrative of the external characters of the eyes of insects. A discussion ensued, in which Mr. M'Lachlan, Mr. Verrall, Lord Walsingham, Mr. Jacoby, Mr. Kirby, and others took part. Mr. A. G. Butler communicated a paper entitled "Descriptions of some new Lepidoptera-Heterocera in the collection of the Honble. Walter de Rothschild." He also contributed a second paper entitled "Synonymic Notes on the Moths of the earlier genera of Noctuites." Dr. Sharp read a paper entitled "An Account of Prof. Plateau's Experiments on the Vision of Insects." Lord Walsingham, Mr. Jacoby, Mr. White, and Mr. Waterhouse took part in the discussion which ensued.—H. Goss, *Hon. Sec.*

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—*May 23rd, 1889.*—T. R. Billups, F.E.S., President, in the chair. Mr. Tugwell exhibited *Acidalia aversata*, bred from a strongly-banded grey form; the only examples bred were specimens of a rich ochreous brown banded form and the var. *spoliata*. Mr. Tutt, long series of *Cidaria truncata* and *C. immanata*, also *Tephrosia crepuscularia* and *T. biundularia*, and made some observations on the two last species. Mr. South, long series of *Hypsipetes sordidata*, comprising examples of the species from various English and Scotch localities, also of *Larentia didymata*, and read notes relative to his exhibit. Mr. White, Hymenoptera collected in the neighbourhood of Colchester. Mr. Billups, *Lithocharis piceus*, *Actobius signaticornis*, and *A. villosulus*, from Lewisham; also the ichneumon *Banchus variegator*, bred from *Panolis piniperda*, and *Ophion luteum*, bred

from *Dicranura vinula*. Mr. Carrington contributed notes on collecting at Horsley, Surrey. Mr. White read a paper, "Observation *versus* Collecting."

June 13th, 1889.—John T. Carrington, F.L.S., Vice-President, in the chair. Mr. Moore exhibited species of Lepidoptera from Antigua. Mr. Wellman, *Macroglossa fuciformis* and *Nemeobius lucina*; also living larvæ of *Halia vauaria*, showing variation. Mr. Helps, *Selenia tetralunaria*. Mr. Robson, specimens of *Sesia formicaformis* with yellow bands. Mr. South exhibited specimens of *Cidaria truncata* and *C. immanata* from various localities, and referred to the first named as having been honoured with no less than eight names, and having been placed in half as many genera, not including Phalæna and Geometra, which were rather tribes or divisions than genera. Seeing how variable the species was, the multiplicity of trivial names was hardly matter for surprise; few, if any, of the entomologists of the present day were inclined to claim specific rank for the forms now so generally admitted to be aberrations of *C. truncata*. As regards *C. immanata*, this insect was not so deeply involved in the synonymic web as that previously considered. Mr. South then proceeded to refer to the various forms and varieties, and illustrated his remarks by his exhibit. Mr. Tugwell made some observations on collecting during the present season.—H. W. BARKER, *Hon. Sec.*

Excursion, June 22nd, 1889.—The first summer excursion of the season took place under the guidance of Mr. John T. Carrington to Horsley, Surrey. The party, which numbered upwards of a score, was conveyed in carriages from the station to Netley Heath, where collecting commenced.

REVIEWS.

Notes and Descriptions of a few Injurious Farm and Fruit Insects of South Africa. Compiled by ELEANOR A. ORMEROD, F.R. Met. Soc., &c. London: Simpkin, Marshall & Co. 1889.

This little work of 110 pages is compiled from material supplied by Mr. S. D. Bairstow, President of the East Province Nat. Hist. Soc. of Cape Colony. Many of the species are actually new to science and have been described especially for this work by Mr. Oliver E. Janson, F.E.S. Altogether, Miss Ormerod has noticed about fifty kinds of injurious insects, and the pages are profusely illustrated by woodcuts. The work cannot fail to be of much practical value to the Colony, as the talented authoress has had under consideration the commoner pests of South Africa.—J. T. C.

A Contribution towards a Catalogue of the Neuropterous Fauna of Ireland. By JAMES J. F. X. KING. Glasgow, Nat. Hist. Soc., 207, Bath Street. 1889.

Any contribution to a knowledge of the fauna of Ireland should be welcome, no matter how fragmentary. Doubtless, as Mr. King expresses in his opening remarks, much remains to be done in working out this group in Ireland. Encouragement will be found in the fact that although so little, comparatively, has been effected in this direction by entomologists in that country, four species at least have been found there, which have not yet occurred in Great Britain. In a summary of species at the end of the work there have been noticed a total of 73 genera and 211 species of Neuroptera as against 129 genera and 350 species recorded in Great Britain.—J. T. C.



F.W. Frohawk del.

C. Butterworth sc.

Group of *Atherix ibis* and parasites.

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[No. 315.]

NOTE UPON *ATHERIX IBIS*, FABRICIUS.

BY T. R. BILLUPS, F.E.S.

(PLATE 7.)

THE very curious group of Diptera figured on plate 7, by Mr. Frohawk, was found in the neighbourhood of Condover, near Shrewsbury, by Mrs. Close, of Condover Hall, who sent the mass of flies to the editor of the 'Field' newspaper for identification.* In due course they were handed to Mr. John T. Carrington, who, finding some living Hymenoptera among them, kindly sent them on to me for examination.

This group was found attached to a sallow twig, which was part of a bush overhanging a lake. It consists entirely of females of *Atherix ibis*, one of the family Leptidæ, which inhabit fields and woods near water. *A. ibis* is a somewhat local insect, that has been recorded from various localities in England and Scotland, but is common in many places on the continent of Europe.

When about to deposit her ova, the female *A. ibis* generally selects the branch of a tree or bush overhanging water, preferably a running stream. Upon this twig she deposits her eggs, and then almost immediately dies. She is followed by others, which conduct themselves in like manner, to the same spot, and so form the pear-shaped mass (as illustrated), varying in size to several inches long, and proportionately wide in diameter. These females, which often number many hundreds, deposit their eggs upon each other when the twig has become covered. The larvæ hatch from these ova, and fall into the water below to undergo their metamorphoses therein.

Curtis, in 'British Entomology,' where he figures both male and female, says that the males may be found in numbers on the banks of rivers after floods.

* [The block illustrating this plate has been kindly lent to the editor of the 'Entomologist' by the proprietors of the 'Field.'—J. T. C.]

The wings of *Atherix ibis* are grey, with black irregular spots the thorax is also black, having two grey dorsal stripes; the space between the eyes in the female being dirty yellow in colour. In both sexes the legs are tawny. The abdomen in the male is tawny, with a black base and tip, and a row of black spots running down the centre. In the female the abdomen is dark grey, with lighter transverse bands. In length it measures about half an inch, and the expanded wings extend rather more than an inch from tip to tip.

The habit of dying immediately after ovipositing is apparently common to the family Leptidæ, which fact was illustrated upon the recent visit of the South London Society to Westerham, in Kent, on the 20th July this year, when Mr. R. Adkin found one species upon the trunk of a tree, dead, by the side of its eggs.

As already mentioned, some living insects were observed among the mass of dead flies. These I found to be of two species of Hymenoptera, both parasitic upon the eggs of *A. ibis*. One species was reared in extraordinary numbers, and most minute in size, being less than one hundredth part of an inch long. Although so small they are remarkably active, their legs being clearly formed for running and leaping. These small insects, which look to the naked eye no longer than specks of dust, are of the genus *Teleas*, having elbowed-twelve-jointed antennæ inserted near the front of the head. These antennæ are slightly hairy and simple in the male, but in the female they are terminated by a six-jointed club. The thorax is short, the abdomen being pedicellate.

Of the second species of these Hymenoptera I only reared two specimens, which are *Antæon alorus*, Walker. According to Professor Westwood, the type of this minute genus is *Ichneumon ovulorum*, Linn.

I shall be glad to hear from other entomologists who have made a study of these parasitic Hymenoptera, with a view to finding out if they have reared more than two parasites from the larvæ or ova of *Atherix ibis*.

There is, I feel sure, an immense field for investigation among Hymenoptera parasitic upon ova of insects, of which there are many species in this country. Their larvæ feed upon the juices contained in the eggs of insects, and they become full-fed within the shell, emerging as perfect ichneumons. They seem to attack ova of nearly all orders of insects, especially Diptera, Lepidoptera, and Hymenoptera; and where they do occur, they are generally in great numbers.

DESCRIPTION OF PLATE 7.—Fig. 1. Group of female *Atherix ibis*. 2. *Atherix ibis*, life-size. 3. Head and antennæ of *Antæon alorus*, male. 4. *Antæon alorus*, female. 5. *Teleas* sp., apterous, female. 6. *Teleas* sp., male.

20, Swiss Villas, Coplestone Road, Peckham, S.E., July 22, 1889.

BRITISH ORTHOPTERA.

By EDWARD INGLEBY MILLER.

(Concluded from p. 175.)

ACRIDIDÆ.

=GRYLLUS-LOCUSTA, L.; GRYLLUS, Fab.; ACRIDII, Latr.; ACRIDIODEA, Wat.; LOCUSTIDÆ, Leach.

Thirteen species. Diurnal insects. The migratory locusts, which do so much damage in foreign countries, belong to this family, and several of them have appeared in this country at various times. These insects are found in fields, sandy heaths, and marshes; they stridulate by rubbing the hind legs against the elytra.

TABLE OF GENERA.

I. Prothorax simple.

1. Elytra and wings very short - - - - - PEZOTETRIX.
2. Elytra and wings perfectly developed.
 - A. Head (seen from above) not more than half as long as pronotum - - - - - CEDIPODA.
 - B. Head (seen from above) more than half as long as pronotum.
 - a. Species larger.
 - AA. Space between eyes less than their length - LOCUSTA.
 - BB. Space between eyes not less than their length PACHYTILUS.
 - b. Species smaller - - - - - STENOBOTHRUS.

II. Prothorax produced behind over the abdomen - - - TETRIX.

1. STENOBOTHRUS, Fisch.

These insects are our common grasshoppers, which we so often hear in sunny pastures. Most of the species are very variable in colour.

I. Antennæ not thickened at the apex (Rhammatocerus).

1. Elytra of female about half the length of the abdomen; of male scarcely as long as the abdomen - - - *parallelus*.
2. Elytra of female about as long as the abdomen; of male longer than the abdomen.
 - A. Outer carinæ on thorax comparatively straight - *elegans*.
 - B. Outer carinæ on thorax curved.
 - a. Elytra distinctly spotted - - - - - *rufipes*.
 - b. Elytra not spotted.
 - AA. A white streak on costal margin of each elytron *lineatus*.
 - BB. Elytra without a white streak - - - *viridulus*.
 - c. Outer carinæ on thorax angular - - - - - *bicolor*.

II. Antennæ thickened at the apex (Gomphocerus).

1. Anterior tibiæ of male thickened - - - - - *sibiricus*.
2. Anterior tibiæ simple in both sexes.
 - A. Elytra and femora distinctly spotted - - - *biguttatus*.
 - B. Elytra and femora scarcely, if at all, spotted - - - *rufus*.

1. *S. elegans*, Charp., 1825. = *tricarinata*, Steph. — Not common; it occurs in marshes in the East of England.

2. *S. parallelus*, Zett., 1821. = *pratorum*, Fieb. — A very distinct species, easily recognised by the shortness of the

elytra. Very abundant in fields from July to September. Fig. 8.

3. *S. lineatus*, Panz., 1796. = *megacephalum*, Steph.; *tenellus*, Stoll.; *fischei*, Eversm.; *nigro-maculatum*, Schæff.; *stigmaticus*, Fieb.—This insect often has a white spot on the elytra, but it is a green species, and cannot be confounded with *S. rufipes*, which is never of that colour. Not common; occurring in fields and meadows during August and September.

4. *S. viridulus*, L., 1761. = *albo-marginatum*, DeGeer, ♀; *rufo-marginatum*, DeGeer, ♀; *nigro-terminatum*, DeGeer, ♂; *rubicunda* (Schæff.), Gmel.—Occurs in sandy places from June to September.

5. *S. bicolor*, Charp., 1825. = *vittata*, Steph.; *modestum*, Seidl.; *murina*, Fieb.—Very common and extremely variable in colour. Found in fields from July to September.

6. *S. rufipes*, Zett., 1821.—This species may be distinguished from *S. bicolor* (which resembles it in very often having the elytra spotted) by the posterior tibiæ, which in the male of this species are reddish with the extreme base and apex dark, and in the female dark, with the portion just below the base pale; whereas in *S. bicolor* they are unicolorous in both sexes. Not uncommon in the South of England; found in fields and meadows during June and July.

7. *S. biguttatus*, Charp. = *pulla*, Fisch.; *biguttulus*, Panz. (nec L.); *rufus*, Zett., var.; *elegans*, Steph., var. ?; *ericetorius*, Steph., var. ?; *calidoniensis*, Stoll.; *maculatus*, Thunb.—Variable in colour. Common on sandy heaths from July to September.

8. *S. rufus*, L., 1766. = *clavicorne*, DeGeer, var. *maculatus*, Thunb.—This species is figured in Stephens's 'Illustrations of British Entomology,' vi. pl. 28, fig. 6. The antennæ are more thickened at the apex than in *S. biguttatus*. Rather local, occurring in the South of England during July and August.

9. *S. sibiricus*, L., 1766. = *clavimanus*.—This insect is figured in Cuvier's 'Regne Animal,' pl. 86, fig. 3. Stephens says it has been taken on the hills near Netley.

2. PEZOTETRIX, Burm., 1839.

1. *P. pedestris*, L., 1761. = *apterus*, DeGeer.—I have never seen this species, which is said by Stephens to be found occasionally at the end of July within the metropolitan district. A specimen was taken by Mr. Billups at Bookham, in Surrey, on the 26th of October, 1886.

3. STETHEOPHYMA, Fisch. = MECOSTETHUS, Fieb.

1. *S. grossa*, L., 1766. = *germanicus*, Stoll.; *rubripes*, DeGeer.—Want of information has compelled me to omit this

insect from the table of genera ; it is said to occur in fields, but is probably not a native of this country.

4. LOCUSTA, L., 1748.

= SCHISTOCERA, Stol. ; ACRIDIUM, auct.

Distinguished from *Pachytylus* by its long narrow form, and the comparatively short space between the eyes ; also by the three transverse furrows on the pronotum. Fig. 9.

1. *L. peregrina*, Oliv., 1807. = *rufescens*, Thunb. ; *flavi-ventre*, Burm.—Figured in Cuvier's 'Regne Animal,' pl. 86, fig. 1. This magnificent species occurred in various parts of England in October, 1869, but has not been recorded since ; it is a native of Asia and Africa.

5. PACHYTYLUS, Fieb., 1852.

- | | | | | | |
|----------------------------------|---|---|---|---|----------------------|
| I. Wings green | - | - | - | - | <i>migratorius</i> . |
| II. Wings yellowish brown | - | - | - | - | <i>flavipes</i> . |
| III. Wings red, with a dark band | - | - | - | - | <i>stridulus</i> . |

1. *P. migratorius*, L., 1793. = *migratorioides*, Reiche. ; ? *cinerascens*, Fab.—This fine species is figured in Donovan's 'British Insects,' viii. pl. 270, and in Cuvier's 'Animal Kingdom' (Griffith), xv. pl. 130, fig. 1 ; it occurs occasionally in this country from August to October in fields, but is not a native. *P. cinerascens* is a variety with the pronotum of equal breadth throughout.

2. *P. flavipes*, Don. (Gmel.).—Easily distinguished from *P. migratorius* by having a distinct yellow stripe on the elytra and three longitudinal carinæ on the pronotum (*P. migratorius* has only one). Occurs in marshes.

3. *P. stridulus*, L., 1761. = *rubripenne*, DeGeer ; *fuliginosum*, Oliv.—I have not seen this species ; ? indigenous.

6. ŒDIPODA, Burm., 1825.

1. *Œ. cærulescens*, L., 1764. = *cyanoptera*, Ramb. ; *sebetium*, Costa, var. β ; *miniatus*, Pallas ; *germanicum*, Latr. ; *fasciatus* (*athrens*), Ger. ; *obscurus*, Petagne ; *fabricii*, Fieb., var. *c*.—Distinguished by its prominent eyes, blue wings (which have a dark band near the hind margin), and the shape of the head. Said to occur in fields. Fig. 10.

7. TETRIX, Charp., 1841.

= ACRYDIUM, Curtis.

These remarkable insects are easily known by the prothorax projecting over the abdomen ; they are the smallest of our Acrididæ, and occur in fields, heaths, and sandy places.

- | | |
|--|------------------------|
| I. Prothorax extending considerably beyond apex of abdomen | 1. <i>subulata</i> . |
| II. Prothorax extending about as far as apex of abdomen | 2. <i>bipunctata</i> . |

1. *T. subulata*, L., 1761. = *pallescent*, Zett., var. ; *undulatum*, Sow. ; *bipunctatum*, Panz. ; *bimaculatum*, Herbst ; *margi-*

natum, Zett., var.; *humemale*, Zett., var.; *dorsale*, Zett., var.; *meridionalis*, Ramb., var.—Both this species and the next are extremely variable, and some authors have described many of the varieties as different species; but there are only two, which are easily distinguished by the comparative length of the prothorax and abdomen. Common; it occurs from April to October in fields.

2. *T. bipunctata*, L., 1761. = *obscura*, Hagenb.; *nigricans*, Sow.; *laterale*, Zett., var.; *vittatum*, Zett., var.; *binotatum*, Zett., var.; *zonatum*, Zett., var.; *obscurum*, Zett., var.; *ochraceum*, Zett., var.; *hieroglyphicum*, Zett., var.; *scriptum*, Zett., var.; *hilare*, Zett., var.; *variegatum*, Zett., var.; *ephippium*, Zett., var.; *carbonarium*, Zett., var.; *pinnula*, Curt., var.; *scutellatum*, DeGeer, var.—Comparatively shorter and broader than *T. subulata*; it occurs from May to September in fields.

[On page 175 in the first part of my article, *Decticus griseus* was in error printed as "very local and rare"; it should have been "local, but not rare."]

Dulwich Village, Surrey, May, 1889.

ON THE VARIATION OF INSECTS.

By T. D. A. COCKERELL.

(Continued from p. 178.)

Class IV.—VARIATION IN THE PREPARATORY STAGES.*

a. *Larvæ*.

Contrary to what might have been expected, larvæ vary greatly without producing any corresponding variations in the perfect insects arising from them; while, on the other hand, the larvæ of an insect which is exceedingly variable in the perfect state may be very constant in colouring, or if there are variations they may have no relation to those hereafter to be observed in the imago. It is, therefore, broadly speaking, impossible to associate the variations seen in the different stages of insect growth together, and larval variations must be treated, at least for the present, as larval variations alone. In considering these variations, the first thing that strikes us is the frequency of simple dichroism, usually exhibited in green and brown forms, and the apparent spontaneity of this variation without direct reference to external conditions or hereditary influences. On further enquiry, however, we find some striking cases in which the variation appears to be phytophagic, and others in which it is of local distribution. The study

* For lack of information about the larvæ in other orders, I am obliged to confine my remarks in this section entirely to Lepidoptera.

of larval variation, like that of the earlier stages of larvæ, is yet entirely in its infancy, and it is not likely that progress will be made until the matter is worked up in some systematic way. I think, myself, although I fear many will entirely disagree with me, that variations in all the preparatory stages ought to be duly registered in our catalogues and treated of in our systematic works under names indicating their peculiarities. Thus:—*Dilophonota ello* var. larvæ *viridis* will mean the green variety of the larva of this moth, while *Papilio asterias* var. pupæ *viridis* is the green form of the pupa of the black "swallow-tail." For brevity, "var. larvæ" and "var. pupæ" might be abbreviated to "l." and "p." It will, no doubt, be urged against this proposition that such an arrangement would enormously increase our already lengthy catalogues, rendering the study of Entomology more complex than ever before; but in reply it can only be said that, after all, we are not responsible for the number of the forms that Nature in her bounty has provided, and that, as a matter of fact, Entomology is a far more complex study than is generally supposed; and it is the business of the true naturalist to examine and to classify all its numerous phenomena, rather than to pass them by with a shrug because they appear so intricately blended together. I doubt whether it is yet possible to give any full analysis of the variations in lepidopterous larvæ, but the following summary of the principal of those which have come under my notice may be found useful.

(1.) *Phytophagic variations.*—*a. Boarmia dejectaria*, larva light pea-green on *Melictylus*, dark brown on *Metrosideros*, and bluish grey on *Solanum*; *B. panagrata*, larva dull olive-green on *Piper*, brownish on *Aristotelia*, and presenting a third variety on *Myrtus* (G. V. Hudson, Entom. xx. 195). These *Boarmia* larvæ, found in New Zealand, resemble in colour their respective food-plants. *b. Spilosoma lubricipeda*, larvæ fed on *Aconitum* were almost black (G. S. Gregson, Young Nat., 1886, p. 192). *c. Samia cecropia*, the lateral tubercles of the larva often display a beautiful pearl colour, in the case of those feeding on *Prunus domestica* (T. G. Gentry, Canad. Ent., 1877, p. 49). *d. Lycæna comyntas*, larvæ fed on *Desmodium marilandicum* were emerald-green with yellow points, while those fed on clover were russet varying to vinous, interspersed with green (W. H. Edwards, Canad. Ent., 1876, p. 205). In many cases of phytophagic variation in larvæ, as also in perfect insects, it is quite possible that the juices of the food-plant may have an immediate effect in producing the colours we see. The dark colour of the elytra of certain beetles, for instance, has been attributed to tannin, and tannin was even found in the tissues of the species in question. Nevertheless, it seems to be established beyond a question that some larvæ, and especially newly-formed pupæ, have a chameleon-like power of

approximating their colour to that of their surroundings. Larvæ of *Catocala nupta* found wild on bark were dark, but others kept in flannel became light; larvæ of *Biston hirtaria* kept in earthenware pans were red-brown, while those found on lime leaves were green. A green one turned red-brown in process of preservation as soon as heated (H. M. Golding-Bird, Entom. xi. 109). It has even been stated that certain larvæ are able to change their colour in the course of a few moments, but I have not found any satisfactory evidence that this is the case. It would appear, rather, that the acquisition of a colour like that of the surroundings is a gradual process, and quite involuntary on the part of the larva. In Buckler's admirable work on the larvæ of butterflies, a very interesting case is recorded in which larvæ of *Vanessa cardui* found on *Malva* developed hairs. In the United States the larvæ of this butterfly are said sometimes to occur on sunflower and hollyhock, but I have not heard whether these differ in any way from the thistle-feeding form. *V. cardui* larvæ found here (Wet Mountain Valley, Colorado, 8000 feet alt.) on *Cnicus ochrocentrus*, Gray, do not differ markedly from the usual form; but I have only found them on the thistles.

(2.) *Seasonal variation*.—Such variation as there may be of a seasonal character exhibited by larvæ is probably more due to the nature of the food-plant than to the direct influence of temperature, &c., upon the larvæ. Mr. W. H. Edwards (Can. Ent., 1878, p. 5) remarks that the summer larvæ of *Lycæna pseudargiolus*, feeding on *Cimicifuga*, are white, and of the colour of their food; whereas in the autumn, feeding on a yellow flower, they are dusky and green. Lepidopterists in England are very familiar with the varieties of the larva of *Smerinthus populi*, which are more or less spotted with red, and there can be no doubt that these occur more abundantly at certain times and places than at others, although the laws governing these occurrences seem to be unknown. *S. myops*, an American species, presents a similar variation in its larva; and according to G. W. Peck (Can. Ent., 1876, p. 239), the larvæ showing red blotches are more prevalent in the late brood.

(3.) *Sexual variation*.—Secondary sexual characters in larvæ seem to be unknown, as might be expected. The larvæ of *Thyreus abbotii* vary from dirty yellowish to reddish brown, and those larvæ with uniform brown mottling were supposed to be females. But C. P. Whitney (Can. Ent., 1876, p. 76) bred some males from the supposed male larvæ, and the idea of colour indicating sex in this instance has now been given up. When larvæ have insufficient food they are smaller than usual, and it is said that such larvæ produce a preponderance of males, but this is of course the direct result of environment. In *Attacus* the sexes can sometimes be distinguished in the larval state by a dark blotch on the under side of the last segment that bears stigmata.

If truly a sexual character, this is doubtless a primary one, and Mr. E. B. Poulton has suggested that it represents the blind termination of the ducts of the sexual glands.

(4.) *Geographical variation*.—The typical larva of *Ceratonia quadricornis*, according to W. V. Andrews (Can. Ent., 1876, p. 40), is green, while a more exceptional form is deep brown. But at Rochester, in New York State, the brown variety is the prevalent one, and the green, so-called, type the exception (Can. Ent., 1876, p. 120). In Britain, the typical larva of *Vanessa atalanta* is grey-green, while black and also dingy white forms occur. But at Coalburgh, in America, Mr. W. H. Edwards found that nearly all the larvæ of *atalanta* were black in the last stage, with the lateral stripe usually macular, and greenish yellow. A small percentage was yellowish green, and a few were mottled black and yellow, but the dingy white form was not to be found (Can. Ent., 1882). Other such cases have been recorded, but it is to be noted that generally the variation is rather in the *proportions* in which certain forms occur, than in their actual occurrence. In cases where the larva presented any noteworthy difference in different regions, the perfect insects have also generally been distinguishable, and the two forms have been regarded as distinct species. Such, for instance, are *Papilio rutulus* and *turnus*, and *Pieris napi* and *oleracea*. Possibly, when larvæ are further studied, specific characters based on larval differences will in many cases prove fallacious, owing to the fact that the larvæ are far more variable and intergrading than has been supposed.

(5.) "*Spontaneous*" variation.—I apply this term to those variations which appear to occur without reference to external conditions, and which are possibly to be traced to some ancestral tendencies, the cause of which is either now obscured or lost sight of. Yet in contemplating the frequent colour-changes of larvæ, and especially the light and dark or green and brown forms of certain species, it is impossible not to think that after all these peculiar variations of colour may simply be due to the instability of the colouring-matter, and its readiness to assume new forms under influences so slight that we have not yet appreciated them. And, indeed, as stated above, a green larva of *Biston* turned red-brown on the application of heat, this being the normal colour of another variety of the same species. To enumerate all the recorded "spontaneous" variations of larvæ would be a gigantic task, but the following may serve as examples:—*Papilio ajax*, larva varies in ground colour from dark smoky brown to grey, blue-green and pale green, each form with peculiar markings. *Vanessa gonerilla*, larva varies considerably (see Entom. xvi. 218). *Deilephila spinifascia*, four vars. of larva are described (Ent. Mo. Mag., 1881, p. 132). *Philampelus achemon*, larva varies from green to pale straw or reddish brown. *Sphinx quinquemaculata*, larva

varies in ground colour from bright green to dark green, dark brown, blackish green, or even black. *Dilophonota ello*, larva varies from green to brown. *Spilosoma lubricipeda*, larva; a. *pallescent*, whitish, with grey hairs; b. *rufescens*, yellowish, with red-brown hairs; the grey variety exists in the proportion of four to one red (E. Birchall, Entom. xi. 77). *Hyphantria cunea*, Prof. Riley (Bull. 10, U. S. Dept. Agr., Ent. Div., 1887) figures varieties of the larva of this destructive species, and says, "Close observations have failed to show that different food produces changes in the coloration; in fact, nearly all the various colour-varieties may be found upon the same tree; the fall generation is, however, on the whole, darker, with browner hairs, than the spring generation." *Cucullia chamomillæ*, Mr. Tugwell has recorded varieties ranging from white to pink. *Catocala polygama*, four forms of larva are described by W. Saunders (Can. Ent., 1876, p. 74). *Eupithecia*; the remarkable variation in the larvæ of this genus can be seen by reference to Newman's 'British Moths,' pp. 120-153. Finally, it is to be noted that sometimes very different-looking larvæ will produce nearly similar moths, a phenomenon observed in *Acronycta* and *Datana*. Mr. A. R. Grote has some interesting remarks on this subject, 'Can. Ent.,' 1877, p. 209, where he says, "There is proof in the excessive variation in the larvæ of a genus where the adults are remarkably uniform in colour and ornamentation, that the larva submits to independent and wide modification from the circumstances of its environment."

ERRATA, &c. — P. 55, line 18 from top, for "Entom. x." read "Entom. xx." *Cirrhædia x. obscura* (p. 55) and *Acronycta t. fasciata* (p. 99) appear to be practically identical with the varieties *unicolor*, Stgr., and *virga*, Tutt, respectively. Mr. W. H. Edwards informs me that the black form of *Lycæna comyntas* (p. 128) is not in the male, the black male *pseudargiolus* being the only such case known to him. Dr. John Hamilton finds that the dark forms of *Ips fasciatus* (p. 129) are not confined to the vernal brood, as was supposed.*

(To be continued.)

DEILEPHILA GALII, WITH REMARKS ON FORCING PUPÆ.

BY J. ARKLE.

"By all means force *all* your *galii* pupæ." Such was the unanimous advice which followed my inquiries on the point. To the fortunate possessor of a hothouse this is easy enough; but to collectors like myself, who are less enviously placed, the

* Dr. Hamilton writes, "*Ips fasciatus* varies in colour, from all black on the elytra, to nearly all yellow. About half a dozen of the forms have received names. . . . All hatched from the same batch of eggs, perhaps" (*in litt.*, April 24, 1889).

matter, after all, is one that presents little difficulty. I am indebted to Mr. McRae, of Bournemouth, for the following plan, which I have tried; and as that gentleman kindly gives me permission to publish it, I feel I cannot do better than give it in his own words. "Procure," he says, "a large flower-pot saucer, filling it with alternate layers of coarse sand, or gravel, and moss, placing the pupæ on the top, and then covering them with a layer of moss. Saturate the whole with tepid water, and over the whole place a bell-glass. Then place the apparatus in front of the kitchen fire, and inside the fender. Place a few twigs on the top of the outside layer of moss, to enable the insects to crawl up and to dry their wings, otherwise *all* will be crippled, as the glass is too smooth for climbing. Emergence may be expected to take place in about three weeks. The temperature will often rise to at least 100° F., and, provided the whole is kept sufficiently moist, and shaded from direct radiation by placing a piece of thick brown paper in front of the bell-glass, this heat will not injure the pupæ; on the contrary, it accelerates development. By planting a piece of board behind the incubator to break the draught of cool air from the door, I often had the bell-glass so hot that I could not place my hand against it. The essential principle of forcing or accelerating emergence is *heat*, and pupæ will stand almost any amount provided they are kept *moist*." "I do not find," continues Mr. McRae, "that the fire going out at night injures the development of the pupæ in the least. There is no such thing as a uniform temperature in Nature, and the range between the maximum and minimum in twenty-four hours, at midsummer, is so considerable that I concluded I need not trouble myself about attempting to keep up a regular and fixed temperature."

This plan has been long known and practised, so Mr. McRae informs me, by the older entomologists, and he adds that it was communicated to him, some twenty years ago, by the late Mr. Edward Newman.

My captures of *D. galii* larvæ ended last season on the 13th of September. Cold and frosty weather set in shortly after, with the result that one of the caterpillars failed to pupate. Still I found myself in possession of twelve healthy-looking pupæ. Some of my correspondents began the forcing process immediately after pupation, and, judging from their results, they were by far the most successful. I, on the contrary, kept mine simply under cover. They were left in the breeding-cage exactly as they had been formed,—slightly below the surface of the sea-sand, but covered by the usual open-below sandy web or shield, and exposed only to the natural dampness of the sand.

On January 1st I examined the pupæ and found five dead and mouldy, so I at once began the use of the saucer, bell-glass, &c.

On the 7th I added three pupæ of *Smerinthus tilia* to the seven *Deilephila galii*, placing the apparatus on a kitchen shelf, where the maximum temperature was 70°. The first *galii* appeared on February 10th. On and about the 17th the weather was very warm for the season, and two more fine *galii* emerged at mid-day on that date. In spite of the succeeding cold, the first *S. tilia* appeared on the 24th. Although the cold weather continued, I began to be surprised at the non-appearance of moths between the last-mentioned date and March 7th, and upon again examining the pupæ I found two more *galii*, dead and covered with mould or white fungus. I then commenced to carry out fully Mr. McRae's instructions, taking care to keep the saucer on a level with the lower part of the fire-grate. The fourth *galii* developed on the 8th, and the fifth and last on the 26th of the month. In the meantime the second *S. tilia* emerged on the 8th, and the third on the 21st March.*

These remarks would possess, perhaps, greater completeness were evidence added from collectors who decided to keep their pupæ till July or August, waiting for possible emergence through natural influences. Had my stock of pupæ suffered less, I intended reserving a few for this experiment. I must therefore rest in the hope that the experience of others may, in time, be forthcoming. I need hardly add that a thorough knowledge of the habits of this insect, and its conduct when exposed to a climate very different to that of the Continent, must go far towards the settlement of what has been, perhaps, too long surrounded by doubt and controversy.

2, George Street, Chester, June 10, 1889.

CONTRIBUTIONS TOWARDS A LIST OF THE VARIETIES OF NOCTUÆ OCCURRING IN THE BRITISH ISLANDS.

By J. W. TUTT, F.E.S.

(Continued from p. 182.)

Luperina, Bdv., *cespitis*, Fab.

The type of this species is described by Fabricius in his 'Mantissa,' p. 156, No. 148, as:—"Noctua cristata, alis incumbentibus fuscis: strigis tribus undatis albidis nigræ innatis, posticis albis." "Media. Caput et thorax fusca, immaculata. Alæ anticæ fuscae nitidulæ strigis tribus undatis pallidis, unica ante medium, duabus pone medium, quæ interne terminantur striga atra. In medio maculæ ordinariæ annulo albo. Posticæ

* Of five larvæ of *D. galii* sent me last autumn by a correspondent at Liverpool, only three attained the proper stage. These three pupæ were kept indoors, but no attempt was made to force the imagines. On the 26th of July a male specimen emerged, and a female on the 28th.—R. S.

albæ margine interdum fuscescente." Hübner figures (428) *cespitis* as "brown with a reddish tinge; a pale abbreviated, followed by a complete basal, streak, outlined in black; stigmata outlined in yellowish; a pale wavy line beyond the reniform, edged externally with black; another pale transverse line parallel to hind margin. Hind wings dark grey, base paler, a pale line parallel to hind margin." There appears to be a little variation in size. I have some specimens from South Wales much larger than some from Lancashire and Sussex. There is also a slight sexual variation, the hind wings of the female being darker than those of the male. The hind wings of the male vary in colour, as noticed by Newman in his 'British Moths,' pp. 297, 298:—"The hind wings of the male are very pale, almost white, sometimes with one, sometimes with two darker bars, parallel with the hind margin: in some specimens I find scarcely any trace of these bars."

Var. *confinis*, St.?—In Humphrey and Westwood's 'British Moths' (vol. i. p. 111) we read:—"Mr. Stephens in his 'Catalogue' regarded as a doubtful variety of this species a unique specimen obtained from the Marshamian collection, which in his 'Illustrations' he described as distinct, under the name of *Chareas confinis*, which differs from the foregoing (*cespitis*) in the paler colour and narrowness of the fore wings, nearly uniformly coloured hind wings, and slightly pectinated antennæ."

Luperina, Bdv., *testacea*, Hb.

The type of this most variable species is figured by Hübner in his 'Schmetterlinge, &c.,' fig. 139. It has the "anterior wings of a very deep (for this species) brown, with a dark outer margin, and clouded with darker around and under the stigmata. The mark, on which Haworth named his varieties, not complete. Hind wings white, lunule clearly marked, with a clouded hind margin." Hübner's type has a central band almost as in Newman's 'British Moths,' p. 296, fig. 1, but has the outer margin darker, and a shade on the outer margin of the inferior wings. This common species varies very much throughout Britain. I have specimens of a clear whitish grey colour, with scarcely a trace of typical markings (var. *obsoleta*), and other extreme forms almost black (var. *nigrescens*). The specimens from the coast districts of Lancashire, and the neighbourhood of Deal and Sligo, sometimes show a great tendency to melanism. The markings also are very variable. Some specimens have a distinct, dark, central band, others have no trace of it. On the hind wings, too, our specimens rarely have the lunule well-marked. In Britain the specimens are not generally brown, although a certain percentage are; grey is the prevailing colour, differing greatly, however, in intensity in different specimens. The Hartlepool specimens are, as a rule, much browner than those I have from any other locality. One specimen from this locality, captured by Mr. Robson, has the nervures of the anterior wings much dusted with

white, giving it a peculiar appearance. I have also seen very brown specimens from Barnsley. Haworth named three forms of this species, and Guenée described two others besides the type. There is but little doubt that the *guenéei* of Newman's 'British Moths,' p. 297, is only an extreme variety of this species. Haworth's three varieties are all based on the character of the mark, which joins the transverse lines, and which is situated directly under the stigmata. The form in which this mark is absent he calls *lunato-strigata*, from the lunar mark in connection with the outer striga being the principal character; the form in which this mark is a simple hook he calls *unca*, and in that in which it forms an χ -like mark he calls χ -*notata*. The following, therefore, is an attempt to tabulate the named varieties:—

1. Var. *obsoleta*.—Pale greyish white, with no darker markings whatever.

2. Var. *guenéei*.—Pale greyish white, some of the markings indistinct.

3. Var. *cinerea*.—Ashy grey, with distinct markings.

4. Var. *nigrescens*.—Blackish grey, with indistinct markings.

5. The type.—Brownish or brownish grey, with well-developed central band.

6. Var. *lunato-strigata*.—Greyish, tinged with reddish or brown; striga beyond reniform composed of lunules, but no mark under stigmata.

7. Var. *unca*.—Greyish, tinged with red or brown; longitudinal hook-shaped mark under stigmata.

8. Var. χ -*notata*.—Like *unca*, but the longitudinal mark χ -shaped.

α . var. *obsoleta*, mihi.—Of a pale ochreous-grey colour, with all the lines, markings and stigmata still paler. This is an extreme pale unicolorous form, and seems excessively rare. I have specimens taken in Deal, and Mr. Percy Russ has sent it to me from Sligo; I have also a specimen closely resembling this obsolete form from Mr. Robson, at Hartlepool; and Mr. Porritt, writing to me some time since, states, "A pale yellowish form occurs near Huddersfield" (*in litt.*).

β . var. *guenéei*, Dbdy.—There does not seem to be the slightest doubt that this is anything but a variety of *testacea* of an extremely pale ground colour, as in var. *obsoleta*, but differing from that variety in having most of the characteristic markings of *testacea* rather more distinctly marked, owing to the paler ground colour; otherwise there appears to be no difference—certainly no specific difference—between the variety and *testacea*. The original description of Mr. Doubleday is transcribed *verbatim* into Newman's 'British Moths' (p. 297), together with notes on its occurrence. Mr. Doubleday writes that Guenée stated it to be his var. A ('Noctuelles,' vol. v., p. 182). If properly worked, I believe *testacea* would in many districts furnish a fair proportion of *guenéei*. Staudinger, in his List, says of it, "Al. ant. unicolor, nigro alboque irroratis." Mr. Vine, of Brighton, sent me a specimen of the genus *Luperina* to look at a short time since, about which he wrote:—"I beat out a *Luperina* from a black-

thorn bush in Abbott's Wood, which I think is *guenéei*." It is, I think, undoubtedly this variety, but it is exceedingly small* (scarcely larger than *Miana strigilis*), very pale grey, with a few very indistinct black costal markings, all the markings of *testacea* faintly marked, the three stigmata traceable although indistinct. Hind wings pale grey. The history of the original *guenéei* may be found in the 'Entomologist,' vol. xviii., p. 54.

γ. var. *cinerea*, mihi.—I have given this name to Guenée's var. β., a not uncommon form in Britain. Guenée thus describes it:—"Superior wings of an ashy-grey, with a slight reddish tinge. The transverse lines indistinct, the basal one having the points at the lower part very pointed. The terminal space edged by a series of blackish streaks, which are placed between the nervures. Inferior wings very pure white, with an indistinct shade. Locality, the Eastern Pyrenees." "This is very different to our *testacea*, but M. de Graslin, who has reared it from the larva, and who is better able to recognize any variation in all its stages than myself, considers it a simple variety" ('Noctuelles,' vol. v., p. 283). This grey form is probably the most common one in Britain; I have it from Sligo, Lancashire, Hartlepool, Aberdeen, Strood, Deal, London, and other localities.

δ. var. *nigrescens*, mihi.—Anterior wings blackish grey, varying in intensity. The markings too vary, some having them darker than the ground colour, while others have them so nearly of the same hue as to make the specimens look almost unicolorous. I have specimens in my cabinet from Sligo, Aberdeen, Fleetwood, and Strood. A black specimen is also recorded (Entom. vol. iv., p. 305) as being captured at St. Ives, Hunts; and Mr. Robson informs me that it occurs at Hartlepool. Mr. C. G. Barrett, 'Ent. Mo. Mag.' vol. xxii., p. 124, writing of this species at Belfast, says, "Several of the *L. testacea* were nearly black"; whilst at p. 188 of the same volume, we read that Mr. Porritt exhibited at the London Society's meeting a melanic specimen from Glasgow.

ε. var. *lunato-strigata*, Haw.—Haworth's type of this variety is described by him as follows:—"Noctua. Alis rufescentibus nigro nebulosis, strigis duabus fasciæque marginali fuscis." "Præcedenti vix differt nisi magnitudine minore, et coloribus saturatoribus, sed rarissime variat" ('Lepidoptera Britannica,' p. 194, No. 97). This form, without the mark under the stigmata, is not uncommon in most localities.

ζ. var. *unca*, Haw.—Haworth's type of this variety is described as follows:—"Alis pallide rufescentibus strigis duabus fasciæque marginali fusciscentibus." "Alæ anticæ subnebulosæ, striga undata fracta ante medium: tunc stigmata ordinaria fusco pallidoque imperfecte marginata: tunc striga secunda extus arcuata, ex lunulis confertis nigris pallido extus adnatis composita; et priore fascia connexa per lineolam nigram uniferam. Margo posticus undatim subfuscus apice pallido. Cilia rufo-cinerea maculis cinereo-fuscis. Posticæ albæ striga in ipso margine subinterrupta fusca, ciliis rufescentibus" ('Lepidoptera Britannica,' p. 194, No. 96). This form, with a simple curved or hooked lineola, joining the transverse lines and extending under the stigmata, is one of our most common varieties.

η. var. *χ-notata*, Haw. Haworth's description of this variety is:—"Alis rufescentibus macula oblonga nigra utrinque emarginata in medio, strigaque arcuata pone medium et lunulis nigris." "Præcedenti valde

* It is worthy of note that Mr. Gregson, 'Entomologist,' vol. iv., p. 51, writes of this species, "I possess specimens from less than 1 inch to 1 inch 4 lines in expansion."

affinis (lunato-strigata), at magis rufescens. Antennæ hirtio-pectinatæ ut in illa, at macula media nigra diversa est. Alæ posticæ albæ, apice strigique in ipso margine fulvis." Another not uncommon form, with the mark under the stigmata somewhat χ -shaped; this is due to the neatness with which the two transverse strigæ approach each other under the stigmata.

MAMESTRA, Och.

With regard to the genus *Mamestra*, most of the species have two extreme forms of variation,—one, pale brownish grey; the other, black, with almost all intermediate forms. *Sordida (anceps)* seems to be the extreme ochreous type of the genus, *persicariæ* the extreme black one. Based on variation, the position of *furva* seems somewhat anomalous, and it seems to me that this species should hardly be placed in this restricted genus at all. With regard to the other species, *abjecta* has two extreme forms, so has *albicolon* (Guenée's 'Noctuelles,' vol. v., pp. 194 and 196), but we do not apparently get the darkest forms of the latter species in Britain, though there is a great deal of variation in our specimens, and *brassicæ* has also two extreme forms. With regard to another phase of variation in this genus, a careful selection of varieties shows that the *albicolon* mark, supposed to be characteristic of one species, is really well-developed in aberrant members of all the other species, the only species in which it is not traceable being in *persicariæ*, but my series of the latter does not contain specimens of those varieties in which the reniform is more or less obsolete, and it is in such I should expect to find it.

Mamestra, Och., *abjecta*, Hb.

The type of this species is represented by Hübner's fig. 539, 'Schmet. von Europa,' which may be described as having—"Anterior wings of deep, but clear, brownish (almost reddish) grey, an abbreviated basal transverse line and a complete one in contact with the inner edge of orbicular, both double; a short dark longitudinal streak under base of median nervure; orbicular distinct, reniform outlined in white; an oblique line from costa to median nervure between stigmata; a wavy transverse line just beyond reniform, followed by four short longitudinal wedge-shaped spots. The dark longitudinal mark under stigmata in Newman's figure ('British Moths,' p. 298) is absent. The hind wings dark grey on outer edge, with pale base and distinct lunule." Staudinger says "forma, al. ant. fere unicolor magis nigris." I rather fail to follow how Staudinger can call Hübner's figure "almost unicolorous"; it certainly is much more variegated than many specimens we get, as the above description clearly shows, but apparently much less so than the ordinary continental form which he has named *variegata*. The most unicolorous forms that I have seen are (1) a fine steely grey form from the

coast of Lancashire, var. *fribolus*; (2) a fine black form from North Kent, var. *nigro-distincta*; and (3) an ochreous grey form, var. *unicolor*. Some of my specimens much resemble Hübner's type (although I have never seen a British specimen exactly like it), others are like Newman's figure, besides the unicolorous forms. There is really very little doubt that this species is in reality polymorphic, closely resembling its near allies, the genus *Apamea*, in this respect. It would be impossible to classify the different forms except in a most general way. Guenée does so by classifying them into those with ground colour "grey-brown," and those with ground colour "grey-black." He writes:—"This species offers, like *albicolon*, two varieties: one of a grey-brown and one of a grey-black. The first is the type of Hübner. The markings are rarely so well marked as in the figure of that author." Guenée then divides the form with a black ground colour into two varieties, the *fribolus* of Boisduval, an almost unicolorous blackish form, and var. B, a black form with the markings more distinct. The *lunulina* of Haworth agrees pretty correctly with Hübner's type. His summarised description is:—"Noctua alis fuscis strigis lunularum pallidarum" ('Lepidoptera Britannica,' p. 192, No. 92). We thus get the following forms:—

1. Anterior wings much variegated with black and white markings, = var. *variegata*, Stdg.

2. Brownish-grey ground colour, with distinct markings, = *abjecta*, Hb.

3. Ochreous or brownish grey, with no markings, = var. *unicolor*.

4. Blackish grey, with distinct markings, = var. *nigro-distincta*.

5. Deep greyish black, with indistinct markings, = var. *fribolus*, Bdv., = *nigricans*, Freyer.

α. var. *variegata*, Stdgr.—Staudinger's description of this variety is as follows:—"Al. ant. thoraceque albido nigroque variis." I do not think many of our specimens have much white about them. The most variegated British specimen I have seen belongs to Mr. Robson, and was captured near Hartlepool. This is much irrorated with whitish scales, and variegated with black; I have one from Shoeburyness less strongly marked. I would include all grey or brown, irrorated and variegated specimens under this name.

β. var. *unicolor*, mihi.—Anterior wings of a brownish grey colour, with an ochreous tinge, and with no distinct markings. This is our more general unicolorous form, and is much more frequent than the blackish grey unicolorous variety. On the east coast it is the form more often met with than any other. I have it from Strood, the neighbourhood of Hull, Shoeburyness; and a series that I have looked over, taken by Mr. Robson at Hartlepool, belong principally to this form.

γ. var. *nigro-distincta*, mihi.—This is Guenée's var. B., which he

describes as follows :—" Similarly (to var. *fribolus*) of a greyish black. All the markings clearly written. Inferior wings with the outer margin more deeply marked, and a more distinct lunule " ('Noctuelles,' vol. v., p. 194). Guenée treats this only as a North American variety, giving the State of New York and Canada as localities. I have specimens of this form only from Greenwich and the neighbourhood of Cliffe (Kent); but although those from the latter locality are well marked, they scarcely appear so, owing to the intense depth of the ground colour.

♂. var. *fribolus*, Bdv.—This is the *nigricans* of Freyer. Guenée's description is :—" Superior wings of a deep greyish black." Same localities as type. I would include all unicolorous, greyish black forms under this name. I have specimens from Shoeburyness, Deal, near Cliffe, and Fleetwood. There appears to be no doubt that the steel-grey Lancashire specimens must be included under this varietal name.

(To be continued.)

ZYGÆNA PILOSELLÆ IN WALES.

BY CHARLES OLDHAM.

IN the second week of June, when visiting the locality where I took this species in 1887, as recorded by Mr. Samuels in the 'Entomologist' for August of that year, I found it on the sunny slopes above the cliffs by hundreds, flying just above the ground in the bright sunshine in its characteristic fashion, and frequently settling on the grass blades. So plentiful was it that a friend and I were able to capture about fifty specimens in a few minutes, without a net, merely picking them from the grass with our hands. The insects were, however, limited to certain patches of cliff, perhaps not twenty yards in length, where they swarmed; and between these favoured spots you might walk for several hundred yards without seeing a single moth. This restriction appeared to have no relation to the distribution of the food-plant (bird's-foot trefoil), which was in flower everywhere.

The insects belong to the hairy-bodied variety *nubigena* (Led.), which Kirby says ('European Butterflies and Moths') "is the ordinary *minos* of British collectors," and they are identical with examples I have from an Irish locality.

Ashton-on-Mersey, July 12, 1889.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

EUCHLOË CARDAMINES, DWARF FORM.—On May 22nd last, whilst insect-hunting in Epping Forest, I took a very small male of this species hovering over the flowers of the wood parsley (*Anthriscus sylvestris*). The insect is barely $1\frac{1}{8}$ inch in expanse.—JAMES A. SIMES; 4, Cricketfield Road, Clapton, July 17, 1889.

VANESSA CARDUI IN JAVA.—I have recently seen a considerable number of these butterflies at and near Lindanglaya, about forty miles from here. Judging from memory they are exactly the same as in England, and certainly haunt similar places, namely, open stony roads. They first occur at about 1500 feet above the sea-level, and I noticed them up to about 4000 feet. There the road entered the forest, else doubtless they would have occurred still higher. In Bombay, some years ago, I used to see a great many; there they occur close to the sea, and at that level. I know *V. cardui* is a very widely distributed species; but is it usual to find it so near the equator as Java?—T. E. SANSOM; Koningsplein, Batavia.

LYCENA ICARUS, HERMAPHRODITE.—On June 22nd I was with Mr. T. Brown, collecting on his farm at Keyingham, South-east Yorkshire, when he caught a specimen of *L. icarus* with the right wings blue, as of the males, and the left wings brown and spotted, like the females.—J. W. BOULT; 17, Finsbury Grove, Fountain Road, Hull, July 6, 1889.

POLYOMMATUS PHLEAS var. SCHMIDTII.—At a meeting of the North Kent Entomological Society, on June 20th, a splendid specimen of the above variety was exhibited by Mr. W. G. Dawson, which had the whole of the copper colour replaced by a beautiful white silvery sheen. The insect was captured a few days previously on Plumstead Common.—H. F. WEBB; 3, Gunning Street, Plumstead.

RHOPALOCERA IN KENT.—I captured a magnificent specimen of *Colias edusa* on the wing, on June 9th, in the chalk-pit at Kemsing, near Sevenoaks, and have heard of two being seen since. I have never taken one before July, though I have been a collector for many years. In the Kemsing district I captured, from May 12th to June 12th, twenty-four different species of butterflies, and a large number of moths—chiefly Geometridæ. They were mostly out much earlier than usual.—CECIL G. STOKOE; The Rectory, Lutterworth, June 28, 1889.

DEILEPHILA GALII IN CHESHIRE.—I have been informed of the capture this year of two fine specimens of *D. galii*, in this neighbourhood. They appeared to be fresh from the chrysalis.—J. ARKLE; 2, George Street, Chester, July 9, 1889.

DEILEPHILA GALII IN KENT.—Last year I found in this neighbourhood two caterpillars of *D. galii* and one of *C. elpenor*. The moths have now emerged, and are without defect.—W. NORTH BUCKMASTER; West Cliff Road, Ramsgate, June, 1889.

SESIA ANDRENIFORMIS AT DOVER.—It will interest the readers of 'The Entomologist' to know that I had the pleasure of taking a fine male *Sesia andreniformis* on July 10th, and another male on July 14th; but I had the misfortune of missing a female on July 14th. Mr. S. Webb was kind enough to identify them for me.—W. DAVIS; 27, Winchelsea Street, Dover, July 16, 1889.

SESIA ICHNEUMONIFORMIS IN GLOUCESTERSHIRE.—On Wednesday, July 17th, while walking along the Gloucester and Berkeley Canal, I saw a male and female of this rather uncommon insect *in copulâ*, settled on the bank. I had only a pocket net with me, but managed to secure them. I placed them both in a box covered with muslin, with pieces of sponge

dipped in syrup, and exposed them on a window-ledge; but much to my disappointment I did not get any ova. I have never taken this insect before in Gloucestershire.—M. STANGER HIGGS; The Mill House, Upton St. Leonard's, Gloucester. [The better way would have been to have placed the female in a covered flower-pot containing growing plants of *Lotus corniculatus*, in the root-stem of which the larvæ feed.—J. T. C.]

ARCTIA URTICÆ IN BRIGHTON.—On the evening of May 26th I took a fresh specimen of *A. urticæ* on a lamp-post in the Preston Road. The only locality mentioned for it in 'The List of Macro-Lepidoptera of East Sussex' is Lewes Marshes.—HENRY G. PLACE; 53, Buckingham Road, Brighton.

STAUROPUS FAGI IN FOREST OF DEAN.—On June 12th I found a newly-emerged male *Stauropus fagi* on an oak in the Forest of Dean. I mention the fact as I have not seen its capture recorded in this locality before.—N. F. SEARANCEKE; Mitcheldean.

CARADRINA QUADRIPUNCTA.—I should think Mr. J. W. Tutt is quite correct (Entom. 187) in his conjecture as to this insect appearing all the year round. On referring to my diaries I find I have taken the insect every month of various years, but find it the rarest in April. In the winter months, say from November to March, it is commonly taken in perfectly fresh condition, in the stables here, by the groom, and brought to me as "something new this time."—A. E. HALL; Norbury, Sheffield, July, 1889.

GEOMETRA VERNARIA, VAR.—I have taken a variety of *G. vernaria*, pale salmon-colour, with the green tint showing in a dash on the two under wings only.—G. M. A. HEWETT; 3, St. Swithin Street, London. [Probably the result of moisture acting on the fugitive green colour.—ED.]

TRIFURCULA PALLIDELLA.—It is ten years since I took a male specimen of this rarity. Yesterday I was fortunate to take a fine female at Dutton. What a queer looking insect! The cilia are more like bristles than feathers; they look like a lot of short hairs. This sex is of a more bronze colour than the male.—J. B. HODGKINSON; Ashton-on-Ribble.

SUGAR UNPRODUCTIVE.—I regret to say sugaring has been very unproductive here all this month, and from the beginning of June, doubtless owing to the cold which always seems to follow sunset.—ALBERT J. HODGES; Elgin Cottage, Freshwater Bay, Isle of Wight, July 13, 1889.

FURTHER NOTES ON THE LEPIDOPTERA OF WIMBLEDON.—Having at one period of my life spent many hours in the pursuit of insects on and near Wimbledon Common, I venture to add a few names to the interesting list of species captured by Mr. Whittle (Entom. 150). I am looking back to a much earlier date, probably, than that to which Mr. Whittle is referring, and some species I used to take have very likely disappeared, or become much scarcer. Longer ago still, in the days of the earlier entomologists, it is enough to make one's mouth water to read of the things they used to take in Wimbledon Park and Coombe Wood, both adjacent localities to the Common: the former of these has long been cut up for building, and the latter seems now about to follow suit. However, while Wimbledon Common is preserved as an open space, and allowed to retain—in part at

least—its native wildness, it will be the home of some good insects. I am sorry that I cannot give the exact dates, but my note-books have been destroyed; the time would be between 1867 and 1872. *Argynnis euphrosyne* and *selene*: the former of these was observable on the Common most years, breeding, no doubt, in the wood close by; of the latter species I got battered specimens in 1868,—probably it had a habitat also in the Wood, but it may have since died out, and the other also. *Vanessa cardui* occurred in lanes near the Common, sparingly, in 1868 and 1869; only the autumn brood was seen. *Hesperia malva*, tolerably abundant some seasons in marshy places, but appeared on the wing for a very brief period. *Macroglossa stellatarum*, occasionally seen on the Putney side of Wimbledon Common; larvæ were formerly not uncommon along the margin of the Thames, feeding on *Galium*. *Sesia formicæformis* was formerly taken amongst willows. *Dicranura furcula*, a few larvæ on the black poplar in August and September. *Trichiura crategi*, once taken; it has also been captured by other collectors occasionally. *Gastropacha quercifolia*, some specimens taken on the rough ground south of the Butts, several years, and shown me subsequently, but I never captured it. *Liparis chrysorrhæa*: imago and larvæ in hedges, 1867. *Euplexia lucipara*: larvæ beaten from various plants. *Cerigo cytherea*, occasionally found on trunks of trees. *Taniocampa munda* used to be found in the Park, also on the Common amongst low plants, but somewhat unaccountably it became scarce. *Cucullia chamomillæ*, some specimens on the palings to the east of the Common; I searched in vain for the larvæ, at the suitable time, on its usual food-plant. *Xanthia cerago*, beaten in small numbers during the autumn, out of mixed hedges. *Euclidia mi*, occasionally flying by day. *Ennomos angularia*: larvæ on various shrubs. *Hemerophila abruptaria*, at rest on fences. *Boarmia consortaria*, taken once by a friend in a riding of Coombe Wood. *Tephrosia punctulata*, not unfrequent some seasons on the Common, and in the adjacent wood. *Pseudoterpna cytisaria*, few in marshy places near the Butts. *Iodis lactearia*; imago and larvæ most years. *Ephyra pendularia*, by beating along the edge of the wood; less common than others of the family that occur here. *Asthenes luteata*, a few specimens in 1870. *Acidalia bisetata*, not unfrequent on palings. *Strenia clathrata*, usually abundant. *Anisopteryx æscularia*: larvæ not uncommon on sloe. *Phibalapteryx lignata*, near Coombe Wood, occasional. *Cidaria fulvata*, very plentiful on the Common some seasons, but confined to a small extent of ground. *Eubolia mensuraria*, frequent on the east side of the Common. *Anaitis plagiata*, a few specimens taken in April or May; not observed in the autumn.—J. R. S. CLIFFORD; 4, Laurel Villas, Old Road, Gravesend, June 15, 1889.

FIRST APPEARANCE OF SEXES OF LEPIDOPTERA.—In many books I have noticed that male insects are always credited with appearing before the females, and even in the last work I perused on "Darwinism" it was again asserted that the males were the first to appear. Now as far as Lepidoptera are concerned, of which I only can speak with certainty, the females in almost every case precede the males by a day or two in my breeding-cages; and as I breed some thousands of imagines every year, and always notice the females emerge the first, and yet always read in books that the males emerge before the females, I should be very glad to have another entomologist's experience in that matter. Of course insects in

general are treated of in the one case, and Lepidoptera only in mine. The only reason I can assign for the females emerging first is, that they require a certain period to elapse before coition with the males, and hence appear before the males are ready for copulation; but that is only conjecture.—A. E. HALL; Norbury, Sheffield, July, 1889.

CICINDELA GERMANICA, *Linn.*, IN DORSETSHIRE.—I beg to record the occurrence of this rare and local beetle lately in Dorsetshire. It appeared to be confined to a very small spot (between Bridport and Lyme Regis). I had no time to search closely for it, but picked up four fine specimens as I passed quickly over the ground, on which there were others also running about. It did not attempt to fly, though the sun was shining brightly. The Rev. W. W. Fowler ('Coleoptera of the British Islands') mentions it as recorded in Dorset by Dawson, but gives no more precise locality, and says that "Black Gang Chine (Isle of Wight) appears to be the only locality in which it is now taken." I have felt it necessary, for obvious reasons, to refrain from giving any clue to the exact spot, but shall be very happy to communicate it to any *bonâ fide* amateur coleopterist who may be in that neighbourhood and desire to search for it.—(REV.) O. PICKARD-CAMBRIDGE; Bloxworth Rectory, July 16, 1889.

NOTE ON EPHIPPIMUM THORACICUM.—Donovan figured this fly in 1813, from a specimen taken in Coombe Wood on June 4th, 1812, by G. Milne, F.L.S., and goes on to say:—"Musca ephippium is considered to be a scarce species in this country. It is known to have been taken occasionally by the old collectors about thirty years ago, or rather more, in the woods about Highgate, which, in consequence of the recent improvements in that vicinity of the metropolis, are now demolished. It has occurred likewise in the woods of Kent. Swainson met with three specimens, at the same time, sticking against the trunks of trees: this happened about twenty years ago, and it was then esteemed a rare circumstance. The red thorax reminds me much of the solitary ant, *Mutilla europæa*. The larva frequents rotten wood." I possess three specimens, which my father purchased from the collection of the late Thomas Desvignes when it came under the hammer in 1868.—C. W. DALE; Glanville's Wootton.

SEHIRUS DUBIUS, *Scop.*, AT HORSLEY, SURREY.—A solitary specimen of this very rare and beautiful Hemipteron, of the family Cydinidæ, was taken while at rest on a dead stem of marjoram by Mr. Carrington, while entomologizing in a rough place south of the Sheep Lees, at Horsley, on the 23rd of May last. I am indebted to Mr. Carrington, who not only very generously presented me with the specimen, but kindly conducted me and several friends over the same ground, on the occasion of the Field Excursion of the South London Entomological and Natural History Society, to Horsley, on the 22nd of last June, and, although we swept vigorously and searched diligently for some considerable time, we were doomed to disappointment, for no other specimen could be found. This being entirely a new locality for *Sehirus dubius*, I think it is worth recording, its only hitherto known localities being Pangbourne (Wollaston), Portland (Dale), and the Isle of Wight (Mr. Edward Saunders).—T. R. BILLUPS.

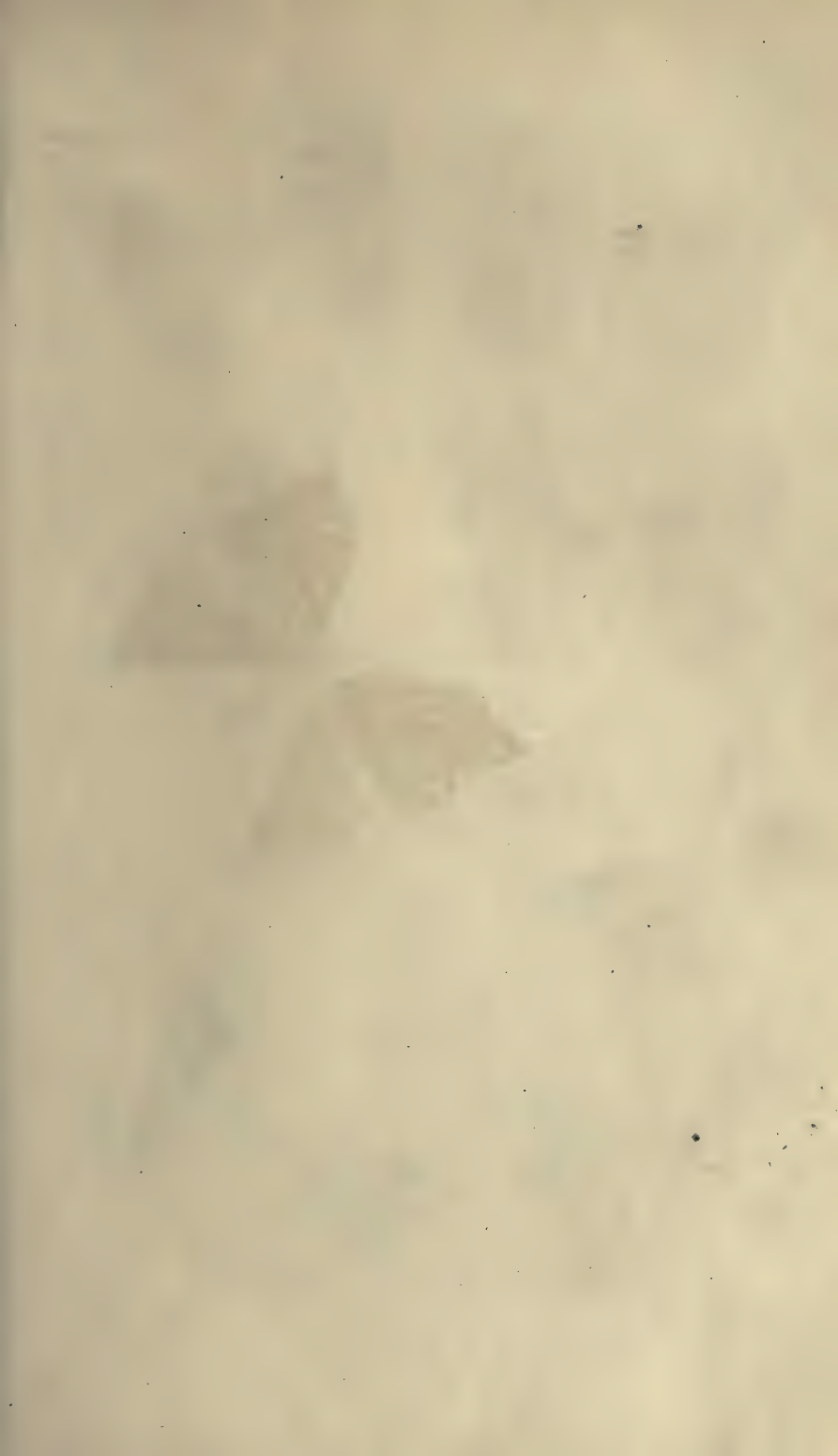
SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*July 3rd, 1889.*—The Right Honourable Lord Walsingham, M.A., F.R.S., President, in the chair. The Rev. W. A. Hamilton (Calcutta), and Mr. H. W. Vivian (Glenafon, Taiback, South Wales), were elected Fellows of the Society. A letter was read from Mr. E. J. Atkinson, Chairman of the Trustees of the Indian Museum, Calcutta, in which assistance was asked from British entomologists in working out various orders of Indian insects. The following motion, which had previously been unanimously passed at the meeting of the Council, was read to the Society:—"That papers containing descriptions of isolated species widely remote in classification or distribution, are, as a rule, undesirable for publication, as tending to create unnecessary difficulties for faunistic or monographic workers." Mr. M'Lachlan, Mr. Jacoby, Mr. Elwes, Dr. Sharp and others took part in the discussion which followed. Mr. J. W. Slater exhibited a doubtful specimen of *Arctia mendica*, L., which appeared as if it might prove to be a hybrid between that species and *A. lubricipeda*, L. Mr. M'Lachlan, on behalf of Prof. Klapálek, of Prague, who was present as a visitor, exhibited preparations representing the life-history of *Agriotypus armatus*, Walk., showing the curious appendages of the case. Prof. Klapálek, in answer to questions, described the transformations in detail. A discussion followed, in which Mr. M'Lachlan and Lord Walsingham took part. Mr. H. J. Elwes exhibited a specimen of an undescribed *Chrysophanus*, taken in the Shan States, Upper Burmah, by Dr. Manders, which was very remarkable on account of the low elevation and latitude at which it was found; its only very near ally appeared to be *Polyommatus li*, Oberthür, from Western Szechuen, but there was no species of the genus known in the Eastern Himalayas or anywhere in the Eastern tropics. Mr. G. T. Porritt exhibited a remarkable series of *Arctia mendica*, L., bred from a small batch of eggs found on the same ground at Grimescar, Huddersfield, as the batch from which the series he had previously exhibited before the Society was bred. This year he had bred forty-five specimens, none of which were of the ordinary form of the species: as in the former case, the eggs were found perfectly wild, and the result this year was even more surprising than before. Mr. R. W. Lloyd exhibited specimens of *Harpalus cupreus*, Steph., and *Cathormiocerus socius*, Boh., recently taken at Sandown, Isle of Wight. Mr. O. E. Janson exhibited a fine male example of *Theodosia howitti*, Castelnau, a genus of Cetoniidæ resembling some of the Dynastidæ in the remarkable armature of the head and thorax. The specimen had recently been received from N.W. Borneo. Mr. W. White exhibited specimens of *Heterogynis paradoxa*, Ramb., and stated that this insect represented an extreme case of degeneration, the mature female being only slightly more developed than the larva, the prolegs being quite atrophied. Lord Walsingham made some remarks on the subject. Mr. W. Warren exhibited bred specimens of *Tortrix piceana*, L. Mr. T. R. Billups exhibited a fine series of the very rare British beetle, *Medon (Lithocharis) piceus*, Kr., taken from a heap of weeds and vegetable refuse in the neighbourhood of Lewisham on May 19th; and specimens of *Actobius signaticornis*, Rey, and *A. villosulus*, Steph., taken in company with the above. Mr. Billups also exhibited specimens of *Eulophus damicornis*, Kirby, belonging to the Chalcididæ, bred from pupæ found by Mr. Adkin attached to the leaves of lime-trees at

Oxshott, Surrey, but the host was unknown. Mr. W. F. Kirby read a paper entitled "Descriptions of new species of *Scoliides* in the collection of the British Museum, with occasional reference to species already known." Mr. J. B. Bridgman communicated a paper entitled "Further additions to the Rev. T. A. Marshall's Catalogue of British Ichneumonidæ." Mr. J. S. Baly communicated a paper "On new species of *Diabrotica* from South America.—W. W. FOWLER, *Hon. Sec.*

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—*June 27th*, 1889.—T. R. Billups, F.E.S., President, in the chair. Mr. Joy exhibited *Bankia argentula* from Cambridge. Mr. Wellman, *Penthina pruniana*, var. *pullana*. Mr. Dennis, a variety of *Argynnis selene*, the black markings of the fore wings forming a broken band across the wings, from Ashdown Forest. Mr. Adkin, *Lobophora halterata*, bred from larvæ taken in W. Yorkshire, where it appears to be abundant. Mr. Tugwell said this was not by any means an uncommon species; he had found it in Berkshire, at Tilgate Forest, and near Hailsham; the larva was peculiarly an aspen feeder. Mr. Strong, *Scodiona belgiaria*, a variety of *Bupalus piniaria*, and larvæ of *Liparis monacha*, from the New Forest. Mr. Waller, a fawn-coloured variety of *Argynnis euphrosyne*. Mr. Frohawk, some British spiders and their nests. Mr. Billups, *Eulophus damicornis*, bred from pupæ attached to the leaves of lime-trees from Oxshott: a specimen of *Schirus dubius*, taken by Mr. Carrington at Horsley, Surrey, this being a new locality for the species; also a series of *Corymbites quercus*, var. *ochropterus*, taken at Armagh, Ireland, by the Rev. W. F. Johnson. Mr. Billups also showed galls on the dead stems of nettle, and the parasite (*Torymus abdominalis*) bred from the same; the galls were found in the neighbourhood of Westerham during May, by Mr. Carrington.

July 11th, 1889.—The President in the chair. Mr. Weir exhibited a specimen of *Pararge egeria*, taken by Dr. Percy Rendall at Puerto Ventura, one of the Canaries: it was apparently the var. *xiphia*, Fab. Mr. West, of Streatham, specimens of *Cidaria dotata*, with dark-banded var. taken in his own garden. Mr. J. A. Clark, specimens of *Retinia resinella*; and Mr. Tugwell made remarks upon its curious habit of feeding and making its cocoon in resinous matter. Mr. Turner, a remarkable albino decoloration of *Melanippe fluctuata*. Mr. Adkin, *Spilosoma mendica*, var. *rustica*, bred from selected parents, the offspring largely following their respective parents; also larva and pupa of *Gonepteryx rhamni*. Mr. N. E. Warne, *Cænonympha typhon* from Cumberland: it was remarked that, like most English specimens, it differed on the under side from the unicolorous Scotch forms. A discussion ensued on melanism, Messrs. Weir, Tugwell, and Slater taking part. Mr. Weir, leaves of *Urtica dioica*, with a number of dead flies attached, which were surrounded by a fungus: Mr. Billups considered they had died from an internal parasite. Mr. Billups, clusters of flies, *Anthrax ibis*, with parasites; also *Orgilus obscurator*, bred from larvæ feeding on sawfly; also *Apanteles ruficrus*, in cocoon, with remains of its host, *Diloba caruleocephala*, and made remarks on the variety of its hosts; besides the above, *Leucania littoralis*, *Spilosoma menthastri*, *Leucania pallens*, *Collix sparsata* and *Agrotis præcox* were mentioned. Mr. Tugwell exhibited stems of *Salix repens*, with what appeared to be galls closely resembling the berries of *Vaccinium*.—H. W. BARKER, *Hon. Sec.*





Horace Knight ad nat.

West Newman & Co. chromo

Varieties in the Genus *Vanessa*.

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[No. 316.]

NOTES ON SOME ABERRATIONS IN THE GENUS *VANESSA*.

By RICHARD SOUTH, F.E.S.

(PLATE VIII.)

Vanessa c-album, Linn., var., Pl. VIII., figs. 5 and 6.

IN this curious aberration, which is from Berlin, the normal fulvous colour is suffused with fuscous. On the primaries the costal black spots are confluent, and the two central ones are hardly indicated; the normal maculation of the secondaries gives place to an irregular-shaped black central patch. The under surface is blackish brown, variegated with tawny along the costa, at the apex and inner angle of primaries, and on the margins of secondaries; the central spot is wedge-shaped and acutely pointed.

Another similar variety, from Switzerland, has the first costal spot of primaries normal, whilst the second is broadly produced outwardly and unites with the third at its lower end, thus enclosing a small patch of the ground colour; the two central spots are dilated externally and unite with the marginal border. Below, the central spot of secondaries is wedge-shaped and sharply pointed, but it has a deep indentation on its upper edge.

Both specimens are in Mr. Leech's collection.

Vanessa urticae, Linn., var., Pl. VIII., fig. 1.

„ „ var. *ichnusoides*, De Selys, Pl. VIII., fig. 2.

„ „ var. *connexa*, Butl., Pl. VIII., fig. 3.

Except that the primaries are crossed by a yellowish fascia, there is perhaps nothing very remarkable about the specimen represented by fig. 1 on the Plate. It is however interesting, because, although of German origin, it exhibits one of the chief characters of the Indian *V. ladakensis*, Moore. This yellowish band, which is the

character referred to, is found indicated more or less clearly in several specimens among the magnificent series of *V. urticæ* from Europe in Mr. Leech's collection, and I have seen traces of it in British examples of the species.

Fig. 2 represents the Japanese form of *V. urticæ*: this is known as *V. connexa*, Butl., and is regarded by some entomologists as a distinct species.

Var. *polaris*, Staud., from Lapland, appears to be a form intermediate between *connexa* and the type.

Vars. *turcica*, Staud., and *ichnusa*, Bon., from the Balkan Mountains, and Corsica and Sardinia respectively, are well-known local forms of *V. urticæ*. The former has no yellow patch near the inner angle, and the two black spots are very small; whilst the last-named variety has neither yellow patch nor black spots above, and the wings are less angulated. Both forms are, however, subject to modification.

Ichnusoides, De Selys, Mén. Liège, ii. (1845), re-described and figured by Lambrichs, Ann. Ent. Belg. xxi. p. 9, Pl. I. fig. 5, is a form of *V. urticæ* which, as regards the primaries, appears to have some of the characters both of *polaris* and *ichnusa*; but it will be seen, on referring to fig. 3, Pl. VIII., that the secondaries are curiously aberrant. The specimen now figured is from Berlin, and is in Mr. Leech's collection: it is not, however, exactly identical with the example figured by Lambrichs, as in that specimen the costal spots of primaries appear to be confluent. Under the name of *atrebatensis*, Boisduval figures another modification of var. *ichnusoides*: this has the two costal spots nearest apex of primaries confluent, the yellow normally between first and second spots only faintly indicated, and the whole insect is much suffused with blackish.

From var. *ichnusa* on the one hand to var. *connexa* on the other is a far cry; and if we had no knowledge of such intermediate forms as *ichnusoides*, *turcica* and *polaris* we might fairly consider the extreme forms distinct species: as it is, there does not appear to be any valid reason for regarding them otherwise than as local forms of *V. urticæ*.

Vanessa io, Linn., vars., Pl. VIII., figs. 7, 8.

A curious form of this species is represented by two examples selected from several similar specimens in Mr. Leech's collection. Figs. 7 and 8 show the extremes between which this form fluctuates. In the large series of *V. io*, which comprises the specimens now figured, are individuals showing various modifications of the "eyed-spot" on secondaries; the gradations between the complete ocellus of the type and the aberration (fig. 8) are well illustrated. These specimens, together with very many aberrations of other species to which reference may be made at a future date, were in an extensive collection of Palæarctic

Lepidoptera made by a well-known German entomologist, and recently purchased by Mr. Leech. It has been ascertained that the examples Mr. Leech has, and a number of others like fig. 7, were bred by a boy in Germany who had secured a batch of larvæ, none of the imagines produced being quite typical.

A variety of *V. io*, bred from a larva found near Lea Bridge, now in the collection of Mr. Bond, and figured in Entom. vi. p. 105, is of the same form as that now figured (fig. 7), but the white spots on primaries are more clearly defined.

Goossens records (Bull. Soc. Ent. France [5], v., cxlix.), a variety of *V. io* which from his description appears to be very similar to fig. 7, and this is probably ab. *dyopthalmica*, Garbini (Bull. Soc. Pad. i. 19, 20), or var. *exoculata*, Weymes (J. B. Ver. Elberf. v. 58), but I have not had an opportunity of seeing the descriptions of either of these.

Mr. Marsh, from larvæ obtained at Grange, bred two specimens of *V. io* which were semi-transparent, due to absence of the normal reddish-brown scales. In my earliest days of collecting I reared a whole brood of such varieties, and turned them all adrift because they did not come up to my idea of what the "peacock butterfly" should be. I need hardly say that in those days I had no knowledge whatever of variation, and but little of typical forms. Coleman was then the only book on Entomology in my possession, or which I even knew of. I may add that I have the work now, and the date is 1863.

Var. *ioides*, Ochs. Schmett. Eur. I. i. p. 109 (1807). This is only a dwarfed form which occasionally occurs in nature, but not confined to any particular country or district. Bernard considers that this form is produced from larvæ which have fed on the flowers instead of the leaves of nettles (Ent. Nachr. ix. pp. 26, 27), but Sequers is of opinion that the small size of *ioides* is the result of a starved condition of the larva, and this agrees with my own observations, for I have often produced the form by simply putting larvæ, after their final moult, on short commons. As far as I know small examples of most species may be obtained by adopting the same plan.

Var. *sardoa*, Staud., is larger in size and more fulvous in colour than the type; it occurs in Sardinia.

Vanessa antiopa, Linn., var. *hygiæa*, Heyd. (= *lintnerii*, Fitch, Pl. VIII., fig. 4, modification.

In his 'Butterflies of New England' Maynard gives a figure of this aberration, and makes some observations on it and the type which it may be of interest to quote here. He says:—"This species is, as a rule, quite uniform in coloration: spring specimens which have hybernated are, however, much paler, and sometimes a summer specimen is quite light on the border. The

width of the border usually varies but little, yet occasionally there is a form in which the band broadens out, especially on the secondaries, and encroaches upon the spaces usually occupied by the dark band, which is entirely absent, as also are the bluish spots. On the primaries the dark band is present, but the bluish spots are missing, and the ground colour inside the band is much more reddish than in typical specimens. This is the form known as *lintneri*, a specimen of which is figured on Plate II., fig. 18*b*. Known from all other butterflies by the dark colour and yellow border. This species occurs throughout New England. The peculiar form of this species which I have figured is usually produced from insects which are typical, and about one in five hundred is said to assume these peculiar colours, which is probably due to the law of reversion. The specimen figured was slightly deformed."

Scudder, in his splendid work, 'The Butterflies of the Eastern United States and Canada,' now in course of publication, says that the first example of *hygiea* which came under his notice was in the collection of Mr. T. L. Mead, and had been taken in Albany. He describes it as follows:—"The upper surface . . . (excepting the mottled costal border of the fore wings) is uniformly maroon, as far as the outer of the two yellow costal bars of the norm, and nearly as far as the inner edge of the blue spots of the norm; beyond this the whole outer portion is of the normal yellow, grizzled with brown, as in the upper part of the fore wing normally; there is no inner costal striga on the fore wings; beneath these are similar peculiarities, with only slight traces of ferruginous on the outer edge." Another specimen, in the collection of Mr. Denton, taken in Ohio, is said to differ from the one just described "in that the yellowish margin of the hind wing is very much broader on the right side than on the left, being more than double the normal width, and having a nearly straight inner margin, suppressing not only the black band which should border it on the inner side, but also the blue spots included in this border. These blue spots are, moreover, wanting in all the other wings, excepting a few scales in the lower median interspace of all the wings, and the upper median interspace of the left hind wing." Quoting Mr. S. L. Elliott, Mr. Scudder goes on to say that "of 380 specimens of one brood twenty-five examples were aberrations:—'Two of the varieties were *lintneri*, from which all the blue had disappeared; the third had the primaries *lintneri*, while the secondaries had the usual blue spots; the fourth had the secondaries *lintneri*, while the primaries bore the blue spots. In the remaining twenty-one the whole upper surface of the wings had a mottled appearance, showing that the colours had been disturbed. They retained the blue spots, but the spots were much smaller than usual,'"

In Ann. Soc. Linn. Lyon, xvi., Millière figures a specimen of *Vanessa antiopa* of the *hygiæa* form from Moravia: this has the inner yellow costal spot on primaries intact; there are also some blue submarginal spots, but the yellow border extends to and absorbs the second costal spot; the secondaries are normal, but the veins are paler. Another variety from Dalmatia, described by Millière, and one referred to by Tarati (Bull. Ent. Ital., xi., pp. 158, 159), appear to be modifications of *hygiæa*. Mr. William Werner records this form of *V. antiopa* from Germany (Entom. xxi. 89); and Mr. William Powley (*l. c.*, p. 109) says that he bred it, with an example of the type, in 1883; but the locality from whence the larvæ were obtained is not indicated. Mr. Leech has several examples of this variety from Germany. The specimen figured has been selected because it exhibits a modification not previously figured. Strecker, in his 'Catalogue of American Macro-Lepidoptera,' notices a specimen, taken in New Jersey, which has the border on the upper surface of primaries black instead of yellow; and Seba (vol. iv., t. 32, figs. 5, 6) represents a variety of *V. antiopa*, in which there are none of the normal white marks on the costa of primaries above, and the under surface of all the wings is of a uniform dark colour, without any ornamentation. Herbst figures a large specimen with the blue spots of considerable size (vii., t. 168).

It would seem that in Canada *V. antiopa* is generally known by the common English name of Camberwell beauty; but in America it is designated the "mourning cloak," which name is, Mr. Scudder says, without doubt a translation of the German "trauermantel." With regard to the yellowish border of this species, Thoreau considers this protective. He says:—"The broad buff edge of the *Vanessa antiopa*'s wings harmonizes with the russet ground it flutters over; and as it stands concealed in the winter, with its wings folded above its back, in a cleft in the rocks, the grey-brown under side of its wings prevents its being distinguished from the rocks themselves."

EXPLANATION OF PLATE VIII.

FIG. 1.—*Vanessa urticæ*, var.

„ 2.—*V. urticæ*, var. *ichnusoides*, De Selys, Enum. Lep., p. 31.

„ 3.—*V. urticæ*, var. *connexa*, Bull., P. Z. S., 1881, p. 851.

„ 4.—*V. antiopa*, var. *hygiæa* (modification), Heyd. Verz. Eur., i., p. 1, t. 1 (1779).

„ 5.—*V. c-album*, var. fig. 6, under surface.

„ 7.—*V. io*, var. ? *dyopthalmica*, Garbini.

„ 8.—*V. io*, var.

ENTOMOLOGY OF ICELAND: NOTES UPON A VISIT
IN 1889.

BY THE REV. F. A. WALKER, D.D., F.L.S., &c.

It will be remembered that I recently asked for information upon the subject of butterflies in Iceland (Entom. 157). As yet my own evidence is negative, and I can only say I have ridden 200 miles in the south-west district of the island, *viz.*, 75 miles from Reykjavik *via* Thingvellir to the Geysir and back (150), and 25 miles from Reykjavik to Krisuvik and back, and have never seen or heard of a single rhopalocerous insect. Some of the days occupied in this mode of travel were so fine and hot, that had there been any butterflies at all in the district I feel sure I should have seen them, more especially as all my time was not spent in riding, but I halted two or three days at Thingvellir, and took several strolls in its valley, during some of the finest weather that we enjoyed on our expedition. What will probably be regarded as a stronger evidence of their non-existence is the fact that Mr. Paterson—a most genial and pleasant Scotchman, who has resided eleven years at Hafnafjordur, in the capacity of English consul, as well as merchant—informed me that he had not seen a single butterfly during the whole of that period.

I am informed, on the reliable testimony of Mr. Jon Thoroddsen, of Reykjavik, who is occupied on the geological survey of the island, that he observed a single specimen of *Vanessa cardui* in Shore Street, Reykjavik, last summer; he said that he knew it again from having seen it in Denmark. He is of opinion that it made its appearance from off one of the Danish steamers or merchant vessels that run periodically between Reykjavik and Copenhagen. This seems probable, particularly as no second specimen is recorded.

In addition to the places in the south-west to which I have ridden, I have also coasted along the greater part of the island, and landed, net in hand, at every fjord where the steamer stopped for a few hours, weather permitting, without seeing any butterfly.

It is my belief that in the passage in which Mr. Symington speaks (in his 'Iceland and the Faroes by Pen and Pencil,' published in 1862) of white and blue butterflies,—both flying and fluttering kinds, in the neighbourhood of the Bruarà River, which we crossed *en route* to the Geysir,—that he must have meant moths, and the Geometridæ in particular, so abundant there, of which the ground colour is white, with a bluish or greyish crooked band across the fore wings.

Mr. Steincke—who passes part of the year in Akureyri and part in Copenhagen, and who is now on board our steamer, the 'Thyra,' as I write, bound for the latter place—informed me that there were a great number of beetles to be found in the North of

Iceland, but only ten species. Also that June was the best time for Lepidoptera, — moths presumably. I have seen several Noctuæ and Geometridæ, collected by him and a relative, as they have been in the habit of supplying the museum at Copenhagen, and also Danish and German private gentlemen, with insects and eggs for some years past. But Mr. Steincke had no butterflies, neither did he contribute evidence of any having been seen.

My friend Dr. Valentine Knaggs, who visited Krisuvik a few days previous to myself, when the weather happened to be very fine and hot, told me that he saw a specimen of one of the larger Fritillaries there, which, having no net, he could not capture. I simply state the fact as recorded on his authority, and do not venture to suggest the possibility of a mistake on his part, as his father's knowledge of Entomology has doubtless rendered him perfectly familiar with the appearance of *Argynnis paphia*, *A. aglaia*, and *A. adippe*. He also stated the occurrence of many very large Noctuæ there.

As though to make up for the total absence of diurnal Lepidoptera, the quantity of certain species of moths is something astonishing. I do not recollect ever having seen Geometridæ so abundant elsewhere, — rising in a cloud from the scrub vegetation when the dwarf willow or birch was lashed by the riding-whip of our guide, on the grassy slopes of the mountains, and likewise on the meadows adjoining the homestead; everywhere most numerous.

There are no bright-coloured insects in Iceland. The moths are generally either marked with grey or dusky, like the lichen-covered boulders of lava, which the moths so closely resemble, and on the surface of which, therefore, they often effectually conceal themselves from view. The flower, *par excellence*, that the Noctuæ affect is *Thymus serpyllum*, which is common everywhere in Iceland, the one plant that flourishes closest to the boiling springs of the Great Geysir and its brethren. I may add that the best localities apparently for Noctuæ in the island are the vicinity of hot and sulphurous springs, whether at Geysir, Krisuvik, or Laug (near Reykjavik), as though they revelled in the warm air and soil. *Noctua conflua* occurs very commonly, and the colour of its upper wings is much varied in different specimens. Of *Larentia cæsiata*, which appeared in full force at Thingvellir on July 14th, — of which species not a single specimen was visible when I left that place for Geysir on July 11th, — the melanic, as well as the paler, form is met with, as in Scotland.

I do not recall having noticed any facts of value as regards geographical distribution. The insects along the north coast, and also the eastern coast, of Iceland seem to me to be precisely the same as those on the western, only that those on the western shore are far more numerous as regards individuals, probably also in species.

I landed at about fifteen different fjords for the purpose of investigation, but only for a few hours on each occasion, when it was a chance whether in that brief interval I could light on the best locality in the neighbourhood, losing time, moreover, by having to wait till the steamer's boat was ready to be sent to shore, having to return to the steamer for one's meals, and sometimes, as the steamer's stay was short, having necessarily to remain near the landing-place.

What has struck me forcibly is the succession of different Geometridæ in point of time, the average duration of any one species in abundance and good condition being from ten days to a fortnight. Diptera would appear to take the place of Hymenoptera, the latter tribe being only represented by *Bombus terrestris*, which occurs very sparingly; and one or two small Ichneumonidæ, also rare. Whereas among the Diptera may be mentioned, first and foremost, *Scatophaga stercoraria* and *Calliphora erythrocephala*, the latter species occurring everywhere in appalling numbers,—on the *Angelica islandica*; on the piles of fish drying on the moor, walls, or boulders at Reykjavik; on a mass of whale-blubber festering in the sun; as well as everywhere else.

I am not aware that any other British entomologist has gone round the coast of Iceland on behalf of science, therefore the name of every species in a list of my captures shall be appended hereto, and when and where obtained. I will, however, first describe the character of the country, and my manner of visiting it.

On July 21st I rode out in the evening from Reykjavik to Hafnafiord *en route* for Krisuvik. This small fishing-town stands on the borders of a quiet and very pretty bay, where there are several fishing-boats riding at anchor. The houses of Hafnafiord are painted grey and red, as at Reykjavik, and there is a good road from the capital here. Also, as at Reykjavik, the inhabitants are actively employed in piling up and drying fish.

On July 22nd, had a call from Mr. Paterson, the English consul here, and a very pleasant personage, who spoke of the Geysirs and boiling pools at Reyka, a day's journey from Krisuvik, as well worth prolonging the excursion for the purpose of inspection. He handed me the keys of the house and store-house at Krisuvik, once the property of the now extinct Sulphur Company, and wherein travellers pass the night. It still contains many of the glass jars, tin vessels, &c., formerly in use for collecting and cleansing the sulphur; as well as a bed, hammock, rugs, coverlets, &c., for the passing visitor. The house is built entirely of corrugated iron, contains several apartments, and is a very well constructed and serviceable dwelling. Captured *Calliphora*; and after being joined by my fellow-travellers, and another guide from Reykjavik, we started, about 5 p.m., with

our united forces, for Krisuvik. When we had proceeded for about two hours, and forded a stream, we dismounted from our ponies on a little grassy islet. The water of the stream here, of which, however, I did not taste, was reported to be strongly chalybeate. The only farm, dilapidated and now uninhabited, on the whole of the way, was next passed. We then skirted the base of some lava hills on our left, past a wide extending desert of lava, as far as the eye could reach, only diversified by hillocks and ridges and jagged peaks, all covered with whitish green moss. I next noticed a natural bridge of lava close to the road, as though constructed for the express purpose of spanning a watercourse. The whole scene was highly picturesque. After some distance—more than half-way, and a steep ascent and corresponding descent—we enter on a plain strewn throughout its extent with small cindery lava, and studded with many boulders that have fallen from the heights above, unless borne down by the lava at some unknown period. A great deal of the more level surface of this plain also is covered with the whitish green moss. The last portion of the twenty miles from Hafnafoord, wherein not a single dwelling or human being was passed, proved very lengthy, trying, and fatiguing from the steep ups and downs, the many brows of hills to be crossed, as well as a plain covered with moss, that treacherously conceals holes, or hides the jagged boulders of lava beneath, or furnishes a superficial crossing, and so tempts one to tread on the velvety but yielding surface. In traversing the whole of this difficult ground we had to dismount, and the ponies to be led. Ultimately a farmer was knocked up on the far side of the plain, who provided some milk for one or two of our party, while a bottle of lager beer was uncorked for the remainder; and this individual undertook to pilot us on his pony over the intervening slopes by the nearest way to Krisuvik, as we had come a considerable distance out of our way. As we alternately ascended and descended several ridges, I noticed a large quantity of oxide of iron on the face of the hills in close proximity to the sulphur, and several solfataras, as well as volcanic lakes, in deeply depressed situations in this neighbourhood. The aspect of the hill-side in places resembles an inflamed and blistered sore, to which similitude the swollen shape, no less than the yellow and white and dark red hues, contribute. We wound our way across one grassy slope after another, crossed a stream flowing between deep banks, reached a meadow full of the hillocks so abundant in all this region, got to the Company's dwelling-house, and sought in its different apartments a few hours much-needed rest. Decidedly Krisuvik presents a sight worth seeing, and the scenery at the place and on the way thither repays one; but it must be owned that it is an arduous undertaking;—twenty miles, for the most part over by far the worst road in Iceland.

(To be continued.)

ON THE VARIATION OF INSECTS.

BY T. D. A. COCKERELL.

(Continued from p. 178.)

Class V.—VARIATION OF PUPÆ AND COCOONS.

It is now perfectly well established that many cocoons and exposed pupæ of Lepidoptera vary very considerably in colour, mainly in the direction of resemblance to the tint of their surroundings. Of these the following may be quoted as instances:—

Pupæ.—*Vanessa gonerilla*, light and dark varieties (Entom. xvi. 218); *V. urticæ*, light and dark varieties were produced by Mr. Jenner Weir by modifying the amount of light at the time of pupating: those in the shade produced the darker forms. *Melitæa harrisii*, Scudd., the typical pupa is white, marked and spotted with black, or brown-black, and orange; a variety is almost without the black markings, but has the orange (W. H. Edwards, Canad. Ent. 1877, 168). *Lycæna comyntas*, pupa from larva fed on *Desmodium marilandicum* is emerald-green, with a yellowish green abdomen, but the pupa from larva fed on clover is sordid white, with the wing-cases apple-green: both forms have also some markings (W. H. Edwards, Canad. Ent. 1876, 204). *Papilio ajax*, L., varies from dead-leaf brown to bright green; and *P. asterias*, Fab., from pale green to ochre-yellow and ash-grey. It has been said that the green pupæ of *P. asterias* emerge sooner than the dull-coloured ones, but I do not know whether this would hold good in a large number of cases. Last year I had a green and a brownish pupa of this species, and the green one gave a crippled butterfly on October 28th, while the other remained over until this year. No doubt the heat of the room brought the green one out thus early, but there was no apparent reason why it should not similarly affect the brown variety.

Cocoons.—*Samia cecropia*, (a) on red currant, silk deep reddish brown; (b) on cherry, plum and rose, light brown, tending to grey; (c) on *Spiræa*, *Symphoricarpos* and *Prunus serotina*, greyish brown (T. G. Gentry, Canad. Ent. 1877, 49). The experiments of Mr. E. B. Poulton to prove that the colours of cocoons are really influenced by the colours of their surroundings are very well known. Cocoons of *Saturnia pavonia* were dark brown when the larvæ were placed in a black bag, but white when they had been freely exposed to light, with white surfaces in the immediate neighbourhood. Larvæ of *Eriogaster lanestris* exposed to white surroundings produced cream-coloured cocoons, while some of the same batch spun dark brown cocoons among the leaves of the food-plant. Larvæ of *Halias prasinana* exposed to

white surroundings produced white and very light yellow cocoons. A larva which spun a white cocoon had previously commenced a brown one, but on being removed to white surroundings it produced white silk. Mr. G. F. Mathew has recorded some very interesting experiments (Trans. Ent. Soc. Lond. 1885, 364), showing the influence of surroundings on the pupæ of species of *Papilio*. *P. godeffroyi*, which had been allowed to pupate on scarlet or white paper, gave rosy-pink pupæ, while those on blue or yellow paper were green, and those on black paper very dark green. *P. schmeltzi* was also experimented upon, but was not so much affected by the colour of background: this was attributed to its having a thicker pupa-shell. The newly-changed pupæ of both species were pale green, and it was not until several hours had elapsed that they assumed the colour produced by their surroundings. Mr. Mathew ventures an explanation of these curious phenomena, and says "They are very soft, and are covered with a thin coating of some viscid substance, which may have the power of absorbing refracted rays of colour-light as they dry and harden." This, however, is rather a peculiar hypothesis, since, if the pupæ were to "absorb" the light reaching them and refracted from the coloured paper, it is to be presumed that they would not at the same time reflect it, and their colour would consequently be the complementary one to that of their surroundings, or more probably black.

HYBRIDS.

The frequency and probability of hybrids in Nature has been very freely discussed at different times, but, owing to the difficulty of obtaining satisfactory data, without any very decisive result. Yet it is quite certain that, at any rate under artificial conditions, hybrids may occur both among plants and animals between genera that are universally considered distinct, while hybrids between allied species are frequently found in Nature. The ducks among birds, and the willows, thistles, and verbascums among plants, afford excellent instances. This being so, there is no apparent reason why hybrid insects should not also occur under natural circumstances, and, as a matter of fact, many such have been recorded. Hagen (Canad. Ent. 1876, 78) enumerates the following hybrids which he found recorded in European literature: — *Saturnia carpini* × *spini* (larva), "*Sphinx*" *vespertilio* × *euphorbiæ* (larva), "*Sphinx*" *vespertilio* × *hippophæes* (larva), "*Sphinx*" *euphorbiæ* × *galii* (imagines, near Berlin), *Zygæna trifolii* × *filipendulæ* (imago, England), *Colias edusa* × *hyale*, *Lycæna adonis* × *alexis*, *Hipparchia arcania* × *hero*, *Cænonympha pamphilus* × *iphis*, *Vanessa urticae* × *atalanta*. A. Wailly (Canad. Ent. 1880, 228) had hybrid larvæ of *Samia ceanothi* × *gloveri*, but they died. P. R. Hoy obtained hybrid *Pieris rapæ* ×

protodice larvæ, but these also died before reaching the perfect state. In 'Proc. South Lond. Ent. Soc.' (1886, p. 32) is recorded a *Xanthia*, supposed by Mr. South to represent *X. fulvago* \times *flavago*. Supposed *Lycæna bellargus* \times *corydon* hybrids are recorded in the same volume (p. 61), and in 'The Entomologist,' 1887, there is much discussion about a form of *Lycæna* found in Kent, referred by Mr. Sabine to *L. bellargus* \times *icarus*.

With regard to this last form, which appears to occur quite numerously in certain districts, the theory was proposed by Mr. South that hybrids between *bellargus* and *icarus* were probably fertile *inter se* and with the parent species, and so he supposed that a local variety might have been founded directly upon the results of hybridization. It is impossible to say that this could not be the case; and indeed we know that by cuttings, &c., florists have been able to propagate hybrids in such abundance and constancy of form that they have come to be looked upon by the public as genuine species,—such, for instance, is the beautiful *Clematis jackmanni*. Nevertheless, the general laws of variation, so far as we understand them, seem to point against the probability of the establishment in Nature of a hybrid race between two forms so distinct as to be looked upon as species, because *when divergent varieties have become so stereotyped, their hybrids are nearly always infertile*, while, on the other hand, *if they are still plastic, the tendency of the fertile offspring will be more often to closely resemble one or the other parent, than to take a position intermediate between the two*. I may have occasion to discuss this question at greater length hereafter, but to enter into much detail would lead rather beyond the scope of the present paper. As to the cause of hybridization in Nature, it may not unfrequently be due to a scarcity of one sex of a species. For instance, Hagen relates that *Tetrao urogallus* \times *tetrix* hybrids occur always when, by excessive hunting, the males of *Urogallus* (capercaillie) are killed in such numbers that the females are obliged to resort to the males of the other species (black grouse). In discussing the *Lycæna* so-called hybrids, it was held by some that the fact of the species not flying continuously together, but only overlapping, so to speak, was rather against the probability of hybridization. To me, it seems quite the other way.

The males of many butterflies emerge about a week before the females, and for the time being must want for mates. Suppose, to illustrate the point, that we have two butterflies, A and B, which are double-brooded, each brood being on the wing one month. The males of each species emerge a week before the females, so that for the first week of the month during which the species is flying we have only males, and by the fourth week the males are about over, and the females largely preponderate. A begins to emerge on the 1st of June, B about the 25th of the

same month, and each has its two broods, with three weeks' interval between each. Thus we get—

JUNE.				JULY.			
1st week.	2d week.	3rd week.	4th week.	1st week.	2d week.	3rd week.	4th week.
A... ♂	♂ ♀	♂ ♀	♀	—	—	—	♂ &c.
B... —	—	—	♂	♂ ♀	♂ ♀	♀	— &c.

From this it is readily seen that we have males of B flying with females of A during the last week of June, each without its proper mate, while again, at the end of July, some late females of B might be found with early males of the second brood of A. What circumstances could be more favourable for the production of hybrids? I have no knowledge whether this is actually the case with any of the species of *Lycæna* that have been under discussion, but I wish to show that, on general grounds, the fact of two butterflies overlapping in their periods of emergence is more favourable for hybridization than if they flew quite synchronously.

(To be concluded.)

CORRECTION.—Maynard's reference (p. 5) to black *females* of *L. pseudargiolus* probably originated in the original error of referring the black males to the female sex. There is no satisfactory evidence of a black female of *pseudargiolus*.

CONTRIBUTIONS TOWARDS A LIST OF THE VARIETIES OF NOCTUÆ OCCURRING IN THE BRITISH ISLANDS.

By J. W. TUTT, F.E.S.

(Continued from p. 210.)

Mamestra, Och., *sordida*, Bork.

THE type of this species is thus described in Borkhausen's 'Naturegeschichte der Europäischen Schmetterlinge,' p. 239:—"It is as large and nearly the shape of *Noctua brassicæ*. The fore wings mottled, with a mixture of earth-grey and pale dirty brown; markings extremely indistinct and pale. In some specimens three pale transverse lines can be distinguished: the one at the base is very pale; the second has particularly strong zigzag marks near the inner margin; the third forms a slight semicircle. They are all paler than the ground colour, but edged with darker. On the inner side of the third line is a row of brownish moon-shaped spots, which turn their hollow sides inwards. Close to the hind margin is a pale zigzag line, which forms in the middle a small Latin W. The ordinary markings between the second and third transverse lines are very faintly marked; the claviform is indistinctly surrounded with whitish grey, and scarcely visible;

the reniform is strongly marked with blackish grey, outlined with whitish, and with a grey centre; the orbicular is pale brownish; the costa has some dark spots, and near the apex are a few yellowish spots. Hind wings whitish grey, shaded with black at the outer margin; veins darker; transverse line sometimes traceable. This *Noctua* varies considerably in the amount of light and dark shading of the wings; in some specimens the colour of the wings is very dark, and frequently black is mixed with the ground colour."

This is another variable species, the ground colour extending from a pale unicolorous ochreous-grey, with scarcely any markings (var. *renardii*), to a bright reddish ochreous (var. *ochracea*), through a dark grey form much suffused with red (var. *anceps*), to a form entirely made up of a dark, dirty-grey ground colour, much suffused with darker greyish brown (the type). The dark red suffused forms (var. *anceps*) and the dark earth-grey and brown (the type) forms are much more common in Kent than any others, the pale ochreous and reddish ochreous forms being rare. The var. *renardii* of Boisduval is an extreme development of the pale ochreous form. Of the general variation of this species, Guenée writes, "It varies much, but all its modifications are too unimportant and unstable to constitute distinct races" ('Noctuelles,' vol. v., p. 195). There would thus appear to be four fairly distinct forms:—

1. A pale unicolorous grey form, = var. *renardii*, Bdv.
2. A reddish ochreous form, = var. *ochracea*.
3. A dark grey, mottled with reddish ochreous, form, = var. *anceps*, Hb.
4. A grey, mottled with dirty brown, form, = *sordida*, Bork.

α. var. renardii, Bdv.—This is a very pale unicolorous variety of *sordida*, with the markings in its extreme forms almost entirely absent, but leading up by intermediate forms into the other varieties. Guenée, in his 'Noctuelles,' vol. v., p. 195, thus writes of this variety:—"This is certainly only a very pale variety of *anceps*. All the markings have disappeared, and the upper wings are entirely of a whitish ochreous colour, with the exception of the terminal space, where there remain traces of greyish colour. The lower wings and the underside are of a pale shining whitish, without markings. North of France." This variety apparently occurs but rarely in England. I have taken it at Sandwich, Deal, and Strood, but have never met with it in any other locality, although I have received it from Brighton. It occurs in both sexes, and the hind wings show a large amount of difference in the quantity of grey shading, some having a distinct dark marginal band; others agreeing with the above description, and being without any very definite trace of it.

β. var. ochracea, mihi.—This is a very pretty variety. It is of a very pale yellowish ochreous ground colour, strongly tinged with red (I have one specimen entirely reddish ochreous), with the stigmata and transverse lines very pale grey. As in var. *renardii* there is scarcely any of the dirty grey colour present in the type, except on the outer margin. The variety occurs

in both sexes. I have captured it at Deal and Strood, and received it from Cambridge, but it is apparently a rare form.

γ. var. anceps, Hb.—The *anceps* of Hübner is an extreme development of the last variety, with the ground colour dark brown instead of pale ochreous, but much mottled with reddish, as in that form. Hübner figures it in his 'Schmetterlinge,' &c., 484, the following being the description made of it:—"Anterior wings ochreous-brown, tinged with reddish; an abbreviated transverse line followed by a complete basal line; claviform outlined in blackish, the reniform and orbicular in whitish; directly beyond reniform, a double line internally edged with black; a pale wavy line close to hind margin, with a W-shaped mark in its centre. Hind wings dark grey, with pale base; two pale transverse lines pass through the dark grey margin." I would include under this varietal name all dark brownish forms mottled with red. This is the most abundant form occurring in Kent, being much more abundant than the type, which is of a greyish colour, marked with dirty brown. The *anceps* of Hübner is the usual form found in London.

Mamestra, Och., *furva*, Hb.

The type of this species is represented by Hübner's fig. 407, which I have described as follows:—"Anterior wings reddish brown, with an abbreviated, followed by a complete basal, streak, both of which are ochreous and very pale in colour; stigmata outlined with yellowish, a dark transverse line passes between the stigmata from costa to inner margin, two pale wavy ochreous lines between the reniform and hind margin. Hind wings grey, dark on the outer edge, with a pale line running through the darker part." My own note is this:—"This is not a good figure of *furva* as we know it, and presents a strong superficial resemblance to *L. cespitis*, but the transverse lines are different to those of that species, and agree exactly with those of *furva*." Guenée mentions two varieties, both from Russia; and Freyer has figured another. Herr Hoffmann, in the 'Stettin Entomologische Zeitung,' writes of the Shetland *furva*:—"Kleiner und dunkler als Stücke aus den Schweizer Alpen." Guenée's description (*vide* var. *ochracea*) of *furva* would answer very well for specimens I have from Ayton (Berwickshire) and Paisley, except that the ground colour is not yellowish brown; but those from Aberdeen, Pitcaple, and Sligo are much darker. My Paisley specimens are of the ground colour of Hübner's type, whilst the German, Swiss, and French specimens are paler. Our Aberdeen and Sligo forms apparently belong to var. *infernalis* and var. *silvicola*, which only appear to be slight modifications of *freyeri*. Taking Hübner's brown form as the type,—Guenée's *furva* is a lighter, *freyeri* and *infernalis* darker, and *silvicola* an extreme melanic form.

α. var. ochracea, mihi.—Guenée, in his 'Noctuelles,' vol. v., p. 197, describes *furva* as:—"Anterior wings yellowish brown, with the three first lines very distinct, wavy, geminated, and outlined with yellowish in the middle; the angulated line composed of lunules in contact, a series of very small yellowish dots between it and the subterminal, which is very distinct,

yellowish, wavy, broken in the centre and marked with an **M**, and preceded by three or four black wedge-shaped marks. The three stigmata clear, the outline of the reniform yellowish, the claviform short, black, often indistinct. Fringe spotted. Inferior wings greyish yellow, with a broad dark border, cut near the anal angle by a short clear line, and a large dark lunule." I do not think we get so pale a variety of *furva* as this in Britain. Mr. N. F. Dobrée writes:—"I have specimens from Turkestan, and these agree pretty closely with the var. *ochracea*" (*in litt.*).

β. var. freyeri, Frey.—The type of this variety is figured by Frey in his 'Neuere Beiträge,' &c., pl. 159. It has the "Anterior wings of a more blackish ground colour." But Guenée, in his 'Noctuelles,' vol. v., pp. 197, 198, writes, "I have seen a specimen sent from Germany under this name, which does not differ in tint from the ordinary *furva*." My own description of *freyeri* is as follows:—"Anterior wings blackish grey, with seven short black costal streaks, with pale (almost white) transverse basal line; orbicular and reniform outlined in white, a pale wavy line directly beyond the reniform, followed by a transverse row of pale ochreous dots, and a pale wavy line (white), edged internally with blackish wedge-shaped marks (in contact) parallel to the hind margin. Hind wings pale grey, outer margin dark grey, lunule and nervures still darker."

γ. var. infernalis, Ev.—"Eversman, 'Bull. Mosc.,' 1842, = *furva*, 'Fauna Ural.,' p. 247," is the reference given by Guenée for this variety. He also describes it as:—"Differs but little from *furva*. It is a little darker. The spaces in the stigmata are marked in brown. The discoidal line of the under sides of the inferior wings is a little more wavy, clearer, and appears a little on the upper side; but these differences are very slight, and perhaps not constant. Localities: Casan, Orembourg, and Ural" ('Noctuelles,' vol. v., p. 198). The specimens I have from Aberdeen would apparently belong to this variety.

δ. var. silvicola, Ev.—Guenée, also on p. 198, describes another Russian variety as "Superior wings still darker, almost black, with the stigmata and lines more or less absorbed by the ground colour. Inferior wings of a blacker shade. Thorax and anal tuft not mixed with yellow scales. Locality: Woods of the Ural." The specimens I have from Sligo would appear to belong to this variety.

Mamestra, Och., *albicolon*, Sepp.

The type of this species is figured by Sepp in his 'Beschouwing der Wonderen Gods,' &c., II., pl. 1, figs. 1-9; and is described by Guenée, in his 'Noctuelles,' vol. v., p. 196, as:—"Anterior wings of a blackish grey, on which stands out strongly the little white broken **C**, which borders the lower and outer edge of the reniform. None of the other markings are very distinct." Guenée also adds:—"I have never found the type in our country (France), where the following variety (*brunnea*) is found occasionally." I have taken this dark type at Deal, and have also received it from Mr. Baxter, where it was taken in the neighbourhood of Fleetwood; but generally our British specimens are the grey *albicolon* of Stephens. Mr. N. F. Dobrée, however, writes:—"I have taken *albicolon* through a series of years on the sandhills at the mouth of the Humber, and there the dark form predominates" (*in litt.*).

Hübner also figures a dark brown form, which Guenée says "occurs occasionally in France." There is a little variation in the character of the pale line, which is parallel to the hind margin; in some the line is fairly complete, in others it forms a row of white dots, while in others they are distinctly yellow. There is also a considerable amount of variation in the colour of the hind wings, this variation not being sexual; in some specimens the hind wings are entirely dark grey, in some pale grey, and in others pale grey with a dark hind marginal band. One of my Deal specimens has a transverse row of white dots between the discoidal spot and the subterminal line, and it is dusted with white along the nervures.

α. var. brunnea, mihi.—This is Guenée's var. A, which he refers to Hübner's fig. 543. The note I made of Hübner's figure is as follows:—"Anterior wings dark brown, but all the markings very distinct." Guenée's description of the variety is as follows:—"Anterior wings yellowish brown, more or less pricked out in blackish, with the subterminal line of a yellowish white, broken up, but well marked, and the ordinary lines more distinct than in the type. Inferior wings paler, and tinged with the yellow of the upper wings" ('Noctuelles,' vol. v., p. 196).

β. var. cinerascens, mihi.—This is the English form, which is much greyer than the continental specimens. It is Guenée's second var., which he calls *albicolon*, St., and he takes as his type Stephens's 'Illustrations,' &c., vol. ii., p. 184, and pl. xxiv., fig. 3. He describes it, 'Noctuelles,' vol. v., p. 196, as:—"Anterior wings ashy grey, strongly sprinkled with black atoms, with all the markings very distinct. The subterminal line as in var. A. The two stigmata paler and clearer. The reniform almost entirely surrounded with white. The black terminal points triangular, and well marked." The only locality Guenée gives is "England." As a rule, our English specimens have not the wedge-shaped spots so distinctly marked. Of this grey (British) variety, Mr. Robson has a strongly-marked specimen, which almost resembles Guenée's var. *β*. It is of a pale ochreous grey ground colour, with the black transverse basal lines very strongly marked, and the space between the strigæ directly before and beyond the reniform filled in with darker, so that it resembles a narrow band. I have seen no other specimens like it.

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

ARGYNNIS AGLAIA, VAR.—Whilst collecting one day during the month of July, in Carmarthenshire, I noticed a beautiful aberration of *Argynnis aglaia*, which I unfortunately missed capturing through its escaping from under the net. On the upper side of the right lower wing, near the base, was a beautiful golden metallic spot, the corresponding marking on the left wing being paler in colour than the general ground colour, so that it, like the metallic spot, was quite noticeable. I might add that the insect was a male specimen, evidently not long emerged.—T. B. JEFFERYS; Cirencester, August 6, 1889.

DEILEPHILA GALII IN YORKSHIRE.—On the 12th instant a fine male specimen of the above insect was brought to me. It was taken at rest in a garden in this neighbourhood. I think this is the first time that *D. galii* has been taken here.—WALTER COPLEY ; Clough Terrace, Sowerby Bridge, August 24, 1889.

SESTIA ICHNEUMONIFORMIS IN GLOUCESTERSHIRE.—I was successful in taking two specimens of *S. ichneumoniformis*, one male and one female, at rest on blades of grass in an old quarry on the side of Stinchcombe Hill, near Dursley, on July 22nd.—T. G. MASON ; 8, Lansdowne Road, Higher Crumpsall, Manchester, August 14, 1889.

ZEUZERA PYRINA.—Records of the capture of *Z. pyrina* (*asculi*) are not very frequent: this may be because the insect is so common that its capture is not thought worth recording, or because it is not very often taken. I have for some years been under the impression that in London the species was common. My past record is as follows:—1881, July 14th: a worn female found on the ground in the garden of the house I used to live in. 1883, July 15th: a worn female brought to me, found in a neighbouring street. 1886, June 30th: a male found at Hackney. July 8th: a male found under a lamp just outside this house. 1887, July 10th: two females emerged from a lilac in my garden. 1888, August 20th: one female emerged from the same tree. 1889, June 28th: a male taken under the lamp already mentioned. In addition to these I have occasionally seen males lying dead inside the windows of public-houses. My captures so far had been sporadic, and had not furnished any very definite indication of the kind of place in which to look for the moth, and of the trees which in London it chiefly affected. On July 5th of the present year the caretaker of an open space in this neighbourhood showed me a male and two females, which he had picked up the previous day under a drooping ash. I found a good many empty pupa-cases sticking out from the tree, and, on exploring the ground thoroughly, was pleased to find a good many infected trees. Between that date and the 15th I secured about forty specimens, most of them having only just finished drying their wings. The proportion between the sexes was very striking, there being only seven males to thirty-three females. Why this should be I know not, unless it be that the larva of the male, being possibly smaller than that of the female, is able to pupate in the smaller branches at the upper part of the tree, whilst the larger female larva is obliged to work its way down to the larger part of the tree to find room. The moths were found at all heights on the trees, from a few feet above the level of the ground up to about twenty feet, and empty pupa-cases were seen sticking out here and there as high as my light could reach. The enclosure, which is about $2\frac{1}{2}$ acres in extent contains lime, balsam and black poplar, willow, alder, and ash trees, but with the exception of one of the alders, the ash trees were the only ones that were infected, and every one of these was more or less so. I have since looked pretty carefully at the trees in the neighbourhood, and have discovered several infected ash trees and one sycamore. The normal hour of emergence is clearly about 3 to 4 p.m. One specimen was still drying its wings at 5 p.m., and many specimens were found at that hour close to fresh pupa-cases, where none had been at mid-day. The time of year at which the insect should be looked for in normal years appears to be the last week in June and the first fortnight in July. A peculiar feature in

connection with the species is the rapidity with which *rigor mortis* passes off. As a rule I find it best to leave insects in the killing bottle for more than forty-eight hours, but *Zeuzera pyrina* sets most readily within twenty-four hours of death, and again stiffens if left longer. Another peculiar feature is the eagerness with which the females, which have only just emerged, deposit eggs as soon as they are placed in a box or killing-bottle. I hope that these notes may enable other London entomologists to hunt for this species with success next year.—FRANCIS JOHN BUCKELL, M.B.; 32, Canonbury Square, N., July, 1889.

ACRONYCTA ALNI.—I have a larva of this moth, which I found feeding on the horse-chestnut. Is not this uncommon for its food-plant? It appears to commence feeding near the midrib of the leaf, and then eats out the centre of the leaf.—T. B. JEFFERYS; Cirencester, August 6, 1889.

LUPERINA TESTACEA, VAR.? GUENEËI.—It may be interesting to state, in relation to Mr. Tutt's remarks for last month upon this insect (Entom. 205), that, among the scores of *L. testacea* I have taken at our Chester gas-lamps, I only numbered one var. *gueneëi*.—J. ARKLE; 2, George St., Chester.

CARADRINA AMBIGUA IN THE ISLE OF WIGHT.—On looking through Mr. A. J. Hodges' collection of Lepidoptera yesterday, I found two fine specimens (male and female) of *C. ambigua*, taken last year in the neighbourhood of Yarmouth. I also captured a worn specimen in the same locality myself this year. This makes three British localities, the previous captures having been made by Mr. Vine at Brighton, and by myself at Deal.—J. W. TUTT; August 22, 1889.

AGROTIS LUCERNEA IN KINCARDINESHIRE.—During July and August this year I took *A. lucernea* abundantly in Kincardineshire near the coast, but it was very local. I never heard of them being taken here before.—L. G. ESSON; 46, North Charlotte Street, Aberdeen, N.B.

NOCTUA SOBRINA IN GLEN ARTNEY, PERTH.—I am pleased to be able to record this at sugar, on August 7th, in a small wood between Dalrannoch and Blairmure, on the Aberuchill estate, Perthshire. The specimen is slightly paler, but otherwise identical with Rannoch examples. The Glen Artney locality is, I suppose, twenty or twenty-five miles south of Rannoch as the crow flies. Sugaring, the few nights I attempted it in Scotland, was far more productive than my essays in that direction at Brockenhurst, Hants, in the middle of June. I was struck with some beautiful varieties of *Xylophasia monoglypha* (*polyodon*), and also of *Calymnia trapezina*, which occurred in multitudes. A fine *Triphæna fimbria* also was captured, *Noctua conflua*, and many others.—J. COSMO MELVILL; Great Marlborough Street, Manchester.

CALYMNIA PYRALINA.—On August 16th I had the pleasure of seeing the whole family circle of *Calymnia* out at sugar, a sight, I should think, not often seen; there was, I regret to say, only one representative of *C. pyralina*, but she paid the penalty of her unwonted publicity. I also took, on the same night, two *Noctua stigmatica* (*rhomboidea*), an insect which has, in this locality, been sufficiently common this year. I observe

that some books mention that it is to be found in this county.—H. J. WHITE; Frogmore Lodge, St. Alban's, Herts.

NATURAL PAIRING OF AMPHIDASYS BETULARIA AND VAR. DOUBLEDAYARIA.—It may be remembered that, last season, I took a female type *A. betularia* and black male *in copulâ*, from an oak in Delamere Forest. Their progeny show 85 per cent. to be black; the rest are ordinary types.—J. ARKLE; 2, George Street, Chester.

CRAMBUS FURCATELLUS IN SUTHERLANDSHIRE.—On July 20th, last year (1888), when ascending Ben Hope, a conspicuous mountain in North Sutherlandshire, in company with Mr. Frederick Hanbury, we carried no entomological impedimenta, our principal object being to study the botany of this remarkable and isolated height (3048 ft.). I was enabled, however, to box a few specimens of a *Crambus*, which was flying about plentifully at about 2000 feet elevation. It appears to be a variety of *C. furcatellus*, differing from specimens I have from Snowdon in the fringe of the upper wings being pearly white instead of grey; posterior wings dark grey, radiately streaked with whitish grey; fringes silvery white. I am not sure whether this moth has been hitherto recorded from Scotland. On the same mountain was a small form of *Scoparia alpinalis*, and *Emmelesia adæquata* was frequent among the heather and cotton-grass.—J. COSMO MELVILL; Great Marlborough Street, Manchester, August 21, 1889.

TORTRIX PICEANA IN NEW FOREST.—I have pleasure in recording the capture of *T. piceana*, by Mr. Charles Gulliver, in Ranmor Enclosure, Brockenhurst. This is the more gratifying as he had devoted a great deal of time in searching for the larvæ, but without success. Those who wish specimens of this rarity will do well to apply to him at once, as he has only a few specimens.—SAMUEL JAMES CAPPER: Huyton Park, near Liverpool, August 8, 1889.

CATOPTRIA EXPALLIDANA, &c., IN THE ISLE OF WIGHT.—I was fortunate in taking a nice series of this very local species in the neighbourhood of Yarmouth at the end of July. Macro-Lepidoptera collecting generally, especially for Noctuæ, was almost a failure, although several local Geometræ were found. Micros, however, kept me busy setting during the time I was in the island, many good local species occurring in fairly large numbers. On the last two evenings of my stay (Aug. 11th and 12th), Noctuæ, although they would not come to the "sugared" trees prepared for their benefit by my friend Mr. A. J. Hodges, came in considerable numbers to the sugared (and unsugared) flowers of *Eupatorium cannabinum*, which were in splendid masses; among others, *Mamestra abjecta* (worn), *Caradrina ambigua* (worn), and *Hadena suasa* (in fine condition, probably a second brood) occurred. Besides Noctuæ, an occasional specimen of *Calligenia miniata*, *Lithosia griseola*, *L. lurideola*, *Epione apiciaria*, *Cidaria silaceata*, *Scoparia cembra*, *Botys asinalis*, *Ædematophorus lithodactylus*, *Rhodophæa advenetla*, and various Depressariæ put in an appearance. Unfortunately I was compelled to leave the island just as the larger things were becoming more lively.—J. W. TUTT; Westcombe Park, S.E.

A FORTNIGHT IN CAMBRIDGE FENS, &c.—On June 22nd, accompanied by two friends, I started for Wicken, where we took up our

quarters for two weeks. The weather was very fine the whole time, not having even a drop of rain; the heavy dews that prevailed and the continual east wind rendered the evenings comparatively unproductive, particularly for sugaring,—still, notwithstanding this drawback, we worked hard, and succeeded in getting several good insects at light, after often staying out all night with our fen-lamp. The following is a list of the most important captures:—*Macrogaster castaneæ* (6, 1 female), *Pterostoma palpina* (2), *Notodonta ziczac* (2), *Pygæra pigra* (6, bred), *Acronycta strigosa* (1), *A. rumicis* (2), *Arsilonche albovenosa* (1), *Xylophasia hepatica* (1), *Neuria reticulata* (10), *Mamestra albicollis* (5), *Agrotis vestigialis* (several), *Dianthæcia carpophaga* (5), *D. irregularis* (9), *Hecatera serena* (3), *Plusia festuæ* (2), *Heliothis dipsacæ* (2), *Acontia luctuosa* (1), *Aventia flexula* (1), *Geometra papilionaria* (3), *Acidalia rubiginata* (10), *Ciduria sagittata* (2), *Lithostege griseata* (2), *Chesias rufata* (1); also a long series each of *Leucania impudens*, *Agrophila trabealis*, *Bankia argentula*, *Toxocampa pastinum*, *Epione apiciaria*, *Hyria muricata*, *Acidalia immutata*, *Timandra amatoria*, *Larentia didymata*, *Eupithecia scabiosata*, *Collix sparsata*, *Lobophora sexualisata*, *Scotosia vetulata*, *S. rhamnata*, *Cidaria dotata*, &c.—J. M. ADYE; Somerford Grange, Christchurch, August 14, 1889.

HYBRID LEPIDOPTERA. — In addition to the species of Lepidoptera which have been known to hybridize, mentioned by Mr. Cockerell in his papers upon the "Variation of Insects" (p. 227), he appears to have overlooked the not uncommon hybrid *Smerinthus ocellatus* × *populi* (Entom. v. 450; vi. 147; vii. 21). The late Fredk. Bond exhibited a hybrid *Clostera curtula* × *reclusa* before the Entom. Soc. Lond., Nov. 17th, 1873.—EDWARD A. FITCH; Brick House, Maldon, Essex.

PARASITES ON BUTTERFLY.—I caught a fine specimen of *Melanargia galatea* at Lulworth, about the first week in August, covered with about a dozen parasites, I understand of the genus *Trypodactylus*. Perhaps your correspondents may have noticed if insects are more generally affected by parasites this year, or otherwise.—ED. PHILIP BELBEN; Bickleigh, Bournemouth West.

CICINDELA SYLVATICA, L., IN HANTS. — On August 7th I observed several specimens of this local species flying in the bright sunshine during the Review at Aldershot, doubtless driven up by the military movements. Not having a net with me, it was no use attempting to chase them, but while returning to North Camp Railway-station I managed to catch two with my hand, one of which, however, bit so furiously that it compelled me to relinquish it. This is probably the first time that the species has been recorded from the locality of Aldershot.—G. A. LEWCOCK; 73, Oxford Road, Islington, N.

SIREX GIGAS.—A fine specimen of this sawfly was captured at Bowes Park, flying in a garden, by my nephew, a very young collector, who brought it to me to be pinned out.—T. ROBINSON; Claysfield Terrace, Winchmore Hill, N., August 13, 1889.

SIREX GIGAS IN IRELAND.—A specimen of this sawfly was taken here on August 7th.—J. B. S. MAC SWAINE; Slandford House, Foxrock, Co. Dublin.

ATHERIX IBIS IN SHROPSHIRE.—While wading and fishing in one of the Shropshire brooks, in June last, I found a cluster of the flies *A. ibis* attached to a dead willow branch overhanging the stream, which at that point was flowing slowly.—C. R. BLATHWATT, West Ashby Vicarage.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*August 7th, 1889.*—The Right Honourable Lord Walsingham, M.A., F.R.S., President, in the chair. The Rev. John Walley, of Wuhu, China, was elected a Fellow: Professor Charles V. Riley, of Washington, United States, was elected an Honorary Fellow in place of the late Dr. Signoret, of Paris; and Colonel Swinhoe and the Rev. F. D. Morrice were admitted into the Society. Mr. Walter F. Blandford exhibited a specimen of *Cardiophorus cinereus*, Herbst, taken at Tenby, and remarked that the species had rarely, if ever previously, been found in the United Kingdom. Mr. C. O. Waterhouse said he believed that there was a specimen in the collection of his late father, and also another specimen in the collection of the British Museum. Mr. Waterhouse stated that the British Museum had just received from the Rev. Arthur Elwin, of Hangchow, China, a luminous larva, about $1\frac{1}{2}$ in. long and $3\frac{1}{2}$ lines broad, which he believed to be one of the Lampyridæ. Lord Walsingham exhibited specimens of *Conchylis degreyana*, M'Lach., bred from seed-heads of *Plantago lanceolata* at Merton, Norfolk; also a specimen of Tineidæ allied to the genus *Solenobia*, probably belonging to *Dissoctena*, Staud., but differing somewhat in the structure of the antennæ. Lord Walsingham remarked that the specimen was taken by himself at Merton on the 31st July last, and that the species was apparently undescribed. Mr. Meyer-Darcis exhibited a collection of Coleoptera, comprising specimens of a species of *Loethrus* from Turkestan; *Julodis globithorax*, Stev., from the Caucasus; a new species of *Julodis* from Kurdistan; *Cardiaspis mouhoutii*, Saunders, from Sikkim; *Carabus smaragdinus*, Fisch., from Siberia; *Julodis ampliata*, Mars., from Aintab, Asia Minor, and a variety of the same from Kurdistan; and *Julodis luteogramma*, Mars., from Syria, and a variety of the same from Kurdistan. Mr. H. Goss read extracts from letters from Mr. R. W. Fereday, of New Zealand, and Sir John Hall, K.C.M.G., relating to a number of Lepidoptera recently collected at sea, about half way between the River Plate and Rio, at a distance of over 250 miles from land, in about 30° S. lat. and 46° W. longitude. It was stated that the ship was surrounded by swarms of moths. Mr. J. J. Walker, R.N., observed that he had seen a large number of insects at sea about 150 miles off the coast of Brazil, and he referred to other records of the capture of insects at sea in Darwin's 'Voyage of the Beagle,' and Dr. Copping's 'Cruise of the Alert.' The discussion was continued by Dr. Sharp, Lord Walsingham, Mr. White, Mr. Kirby, and others. Mr. E. Meyrick read a paper, entitled "On some Lepidoptera from New Guinea," and exhibited the species therein described. He stated that the specimens were derived from two sources, viz. (1), a portion of the collection received by the Society from Baron Ferdinand von Müller, F.R.S., and collected by Mr. Sayer when accompanying the Australian Geographical Society's Exploring Expedition; and (2), a number of specimens collected by Mr. Kowald near Port Moresby, and obtained from him

by Lord Walsingham. Mr. Blandford read a letter from Mr. Wroughton, of Poona, Deputy Conservator of Forests, asking for assistance in working out certain Indian Hymenoptera and Diptera in the collections of the Bombay Natural History Society. Lord Walsingham, Colonel Swinhoe, and Mr. Moore made some remarks on the subject.—H. Goss, *Hon. Secretary*.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—*July 25th, 1889.*—T. R. Billups, F.E.S., President, in the chair. Mr. R. South exhibited a fawn-coloured var. of *Argynnis adippe*, the black spots being represented by hyaline spots; also two vars. of *A. euphrosyne*; the var. of *A. adippe* and one of those of *A. euphrosyne* were received from a correspondent in Kent. Mr. West, specimens of *Apamea ophiogramma* taken in his garden at Streatham. Mr. R. Adkin, examples of *Selenia lunaria*, *Bupalus piniaria*, *Amphidasys betularia*, and *Odonopera bidentata*, bred from larvæ and pupæ received from Forres. Mr. Frohawk, pupæ of *Gonopteryx rhamni*, and called attention to their resemblance to young birds; also living larvæ of *Nemeobius lucina*. Mr. Wellman, bred series of *Sesia tipuliformis*, *S. myopiformis*, *S. formiciformis*, and *S. musciformis*; the last-named bred from pupæ from the Isle of Man. Mr. Auld, three specimens of *Callimorpha hera*, var. *lutescens*, bred from ova obtained from a female of that variety taken in Devon, 1888. Mr. J. T. Williams, an example of *Arctia caia*, the red colour of the inferior wings being replaced by orange. Mr. T. R. Billups, six out of the seven species of social wasps indigenous to this country, viz., *Vespa crabro*, *V. vulgaris*, *V. germanica*, *V. rufa*, *V. sylvestris*, and *V. norvegica*, and read notes relative to his exhibit. Remarks were made by several members on the failure this year of sugar to attract moths, and a discussion as to the cause of this ensued.

August 8th, 1889.—The President in the chair. Mr. Dawson exhibited a specimen of *Deilephila livornica*, taken in the neighbourhood of Plymouth, 1888; a melanic form of *Teniocampa incerta*, taken at Plumstead; two vars. of *Polyommatus phlæas*, one being the var. *schmidtii*, taken at Plumstead. Mr. Carrington said he only knew of three or four examples of this var. having been taken during the last ten or fifteen years. Mr. Tugwell remarked that he did not altogether agree with Mr. Carrington that *schmidtii* was so rare; he thought that in nearly all the principal collections there were forms approaching this variety. Mr. Dennis showed forms of *Bryophila perla*, including several yellow specimens, and one having the superior wings almost entirely suffused with black. Mr. R. Adkin, a specimen of *Charocampa porcellus*, bred from a larva found last year, and which was put in a box without any earth, and had spun a cocoon some way from the bottom of the box within which it pupated. Mr. Joy, a var. of *Epinephele hyperanthes*, having the spots on the under side unusually large. Mr. Turner, a larva of *Diceranura vinula* affected by some disease which Mr. Tugwell said seemed to be the result of a fungoid nature. Mr. Billups, a female example of *Bracon roberti*, taken in his garden at Peckham; also series of *Ascogaster varipes* (both sexes) and *A. instabilis*, and read notes; also galls on *Salix herbacæ*, and their maker *Mematus herbacæ*. The Secretary, on behalf of Mr. T. D. A. Cockerell, two galls, found at West Cliff, Colorado, on the wild rose, viz., *Rhodites bicolor*, and the fly bred from the other Mr. Cockerell proposed to call *Rhodites rosæfolii*, n. sp. A communication was also read from Mr. Cockerell on "Bees and Poppy Flowers."—H. W. BARKER, *Hon. Sec.*

FREDERICK BOND.

Born, February 22nd, 1811.

Died, August 10th, 1889.

AGED SEVENTY-EIGHT YEARS.

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INVESTIGATION OF VARIATION.

BY THE EDITOR.

DURING the past few years great strides have been made towards a better knowledge of the range of variation in insects. A decade ago the number of students of this interesting subject could be counted by units; their ranks now include many, in all parts of the world. It is highly satisfactory to find that latterly there has arisen such an appreciation; and much has recently been done towards a discovery of the causes of variation of colour and shape of animals, beyond the generally accepted one of "adaptation to the environment." This is, of course, satisfactory so far as it goes; but as yet the whole knowledge on the subject is very small, in comparison with that which has still to be attained.

Every credit is due to those who have done much towards unravelling the tangle, but that much is little; and, after all, it is only individual effort. Individual action, although of the first necessity, rarely brings forth results commensurate with the individual labour bestowed upon a little known subject. The total material available to one person, unless in very exceptional cases, is rarely sufficiently exhaustive to enable exact facts to be attained. Again, the publication of such facts must be intermittent and in various channels, which may after lapse of time become overlooked, so causing unnecessary labour in going over already trodden paths. To publish such facts in large form is expensive, when properly illustrated, and generally a tax upon the author, the demand for his book being confined to the limited number who take an active interest in his work. Thus his chances of disseminating his hard-won knowledge are fettered. Further, his facts published, after all his trouble and expense, may not be the best facts which he possesses, or best arranged for the advancement of knowledge. Some one else may have other facts, which, if incorporated, would greatly enhance the value of the work.

Only men of leisure and means can hope in this wise to succeed. The professional naturalists, who gain their whole knowledge in museums, are either partially occupied in studying variation, or fail because they have only the dried specimens to deal with, and are without much knowledge of the surroundings in which the animals lived.

The answer to all this is in properly regulated co-operation of the workers. In this number of the 'Entomologist,' Mr. T. D. A. Cockerell concludes his very excellent series of papers on "Variation of Insects." In his last paragraph he invites opinion upon the establishment of a committee in London, for the collection and editing of all possible material upon the subject of variation of insects. This is a good suggestion, so far as it goes, but it is imperfect. His mode of election would not, it is to be feared, come out well, and be too irresponsible. Properly carried forward, the work of the proposed committee would be very heavy and most onerous. Experience of such committees is, that they get along pretty well for a time and then get lax, or collapse altogether, from the fact that what is everyone's business is that of no individual.

The right course seems to be to establish a properly constituted association of those who work actively, and others who take a passive interest in the subject. The former, as in all societies, will naturally be elected to the management of the affairs. This association should not confine itself to the study of variation of any particular group of animals, because the causes which operate upon one, probably do more or less upon another. The council might, however, nominate from the whole body of members, including themselves, sectional committees to deal with the various orders, with one general committee to revise the whole. Honorary work is good, where it is impossible to afford other. It is very unlikely, however, that assistance of that character can be obtained for the actual drudgery of searching throughout the voluminous literature of all countries, in the past, as well as that current. Such will have to be paid for, which, with publication and other expenses, would require a considerable income. Now, can such a society be established? Are there a sufficient number of students of variation to support such an association?

The whole scheme is well worthy of consideration, and should be threshed out. Any of our readers who would care to send their opinions for publication, or their names, to the editor of the 'Entomologist,' with the object of preliminary consideration, will be communicated with, and, if possible, a meeting arranged for discussing what can be done. The entomologists might found the society, and afterwards invite students in other orders to join. It might be called the "Society for Investigation of

Variation," or any other name; the shorter the better. It should be international in its operations.

JOHN T. CARRINGTON.

London, September 21, 1889.

ON THE VARIATION OF INSECTS.

By T. D. A. COCKERELL.

(Concluded from p. 229.)

THE phases of variation, briefly described in the previous parts of this paper, will probably be found to include most of those to which insects, and especially Lepidoptera, are liable. At present, and in the limited space of a magazine article, it is impossible to treat the subject in any degree of completeness, so I trust that omissions of many important and well-known varieties from the list will be forgiven. Under colour-varieties, those occurring in the Coleoptera are well deserving of lengthy treatment, such as the variations in the metallic colours of the Carabidæ, the markings of the Coccinellidæ, the colours in *Donacia*, &c. Mr. T. H. Hall has kindly sent me some very interesting notes on the variation in British Coleoptera, from which I select the following, as illustrating the principal phases of variation to be noted:—

Pterostichus.—It is very noticeable that many species of this genus vary from black to brown or testaceous; the light specimens seem chiefly to occur, in my experience, under stones, &c., in winter. I put them down as immature. *Harpalus æneus*, F. (*proteus*, Payk.).—Varies from a brilliant metallic shining green insect to one quite dull and brown, with the slightest sheen of green on its elytra; the dull variety seems somewhat local, and occurs in singles; some specimens are rich bright coppery colour; the variation is in colour of elytra, the thorax, &c., being green, but varying in brightness. *Coccinella variabilis*, F.—A strikingly variable species; there is a dark and variable variety, with yellow spots; there appears to be a uniformly parallel variation of thorax and elytra. *C. 11-punctata*, L., and *C. 7-punctata*, L.—Vary in size and definition of spots on elytra; the light coloured ones have smaller spots than the dark ones. *Typhæus vulgaris* (= *typhæus*, L.).—Is very variable in size and appearance; out of a number found in one locality no two are alike; the female varies in rugosity of front of thorax; in the females the thorax is produced into horns of variable size; there is a variety of male and female which is brown instead of black. *Callidium violaceum*, L.—Amongst many specimens found at Wormwood Scrubs, London, the males, which are of much

smaller size than the females, are purplish metallic in colour, and the females bluish or violet. This may be a local variety of a male imported in the timber posts, in which I found it. *Donacia sericea*, L.—Is most variable; I have not a pair alike in colour of both sexes; cannot remember seeing a pair in which male and female were alike in tint, coupled. I have pairs as follows:—

- | | |
|---------------------------|------------------|
| 1. ♂, violet, paired with | ♀, coppery. |
| 2. ♂, black „ | ♀, coppery. |
| 3. ♂, bright green „ | ♀, brassy. |
| 4. ♂, deep purple „ | ♀, bright green. |

In Rhyncophora, the various species of *Polydrosus*, *Strophosomus*, *Hypera*, &c., vary greatly from dark to light specimens.”—(T. H. Hall, in *litt.*, July 23, 1889.)

Calosoma wilcoxi, an American species, presents an interesting variety, as I learn from Dr. John Hamilton. The type is a very green insect, with the margin of the thorax and elytra golden; but Dr. Hamilton found a specimen in which the green was replaced by purple-black, and the golden by purple-blue.

With regard to the Hymenoptera, Mr. Ashmead has kindly written me as follows:—“The dimorphic forms in the Cynipidæ are nearly always paler than the sexual forms, *i.e.*, honey-yellow, brownish yellow, or reddish-brown; the sexual form usually being black or brown. Cynipids, placed in the genera *Biorhiza* and *Acraspis*, comprise only females of some unknown sexual form, so that it must be the females that depart from the original type, and not the males. The female cynipid certainly cannot represent the ancient type, *i.e.*, the agamic form cannot, as it is a degraded form, and necessarily must be the result of some change in environment—either climatological or food-supply. As far as my observations go, it is usually the female hymenopter that is the most variable, and the male the most persistent, although my observations are too meagre to generalise upon.”—(W. H. Ashmead, in *litt.*, April 21, 1889.) These observations are exceedingly interesting, as bearing upon the question whether the male or female is usually the oldest type in insects.

In previous parts of this paper, I have referred to the so-called “hermaphrodite” insects (Entom. 26), and objected to the term hermaphrodite as used in this sense. Mr. Jenner Weir has written in reply to some of my objections:—“I quite agree with you that, properly speaking, the word hermaphrodite should be more restricted in its meaning; but you must recollect that it means a union in one individual of the attributes of Venus (Aphrodite) and Hermes (Mercury); not, therefore, as you say, a *functional bisexual animal*.” Nevertheless, the term is commonly used in zoology to mean a functionally bisexual animal, as, for example, a snail (*Helix*); and if we are to call the apparently bisexual Lepidoptera hermaphrodites, we must have a new term

for the truly bisexual forms, an arrangement which will scarcely be conceded by zoologists. It remains, then, to find a suitable term for our pseudhermaphrodite insects. Mr. Jenner Weir (*in litt.*) has alluded to them as "biformed." I would suggest, however, that the term "*biformed*" be used for varieties combining two forms of one sex, as I have described under "g" (*Entom.* 6), and that the pseudhermaphrodites be known as "*intersexual*" forms.

Dr. John Hamilton (*in litt.*, July 27, 1889) has sent me some very interesting remarks on variation in size in Coleoptera, as follows:—"Assimilation power has certainly much to do with it, where the supply of food is unlimited; as, for example, I am rearing *Balaninus*, and I find the same species varying in size from .15 inch to .33 inch, bred from very large acorns, where all the larvæ in an acorn (from one to five) went into the ground before the whole acorn was consumed. And, again, in raising Longicorns and other beetles from wood, where all the larvæ have apparently an ample supply, it must be individual difference in power of assimilation that produces such great differences in size as often occur. But this will not altogether account for racial differences, or differences of a geographical character; as, for example, *Prionocyphon discoideus*, Say, is .20 inch in length, and all the examples found in some locality will be about that size, but in a neighbouring locality, not perceptibly different, all found will not exceed .15 inch. Again, *Uloma punctulata*, as found here (Allegheny, Pa.), is about one-fourth longer and wider than the specimens from Florida and Georgia."

And now, in conclusion, I would appeal to *all* entomologists to take careful note of the varieties they meet with from time to time, and especially the conditions under which they exist. If I may make a suggestion in the matter, it is that a small committee be appointed in London to receive and edit descriptions and reports of varieties from all parts, and prepare a summary of them for publication in the 'Entomologist.' At present the records are scattered, and most of the finds remain unpublished; but how interesting it would be if we could have careful reports compiled from hundreds of records, such as "Melanism in 1888," "Comparison of size of northern and southern insects"; and so on through the whole imaginable series. The benefit to science from such an arrangement would be *immense*, and it would be easy to do it. Let the readers of the 'Entomologist' nominate their committee, and let the committee get about their work without delay. A month lost can never be regained. What does the editor say?

West Cliff, Colorado, U. S. A.

ENTOMOLOGY OF ICELAND: NOTES UPON A VISIT IN 1889.

BY THE REV. F. A. WALKER, D.D., F.L.S., &c.

(Continued from p. 225.)

ON July 23rd I visited the "Phlegræi campi" after breakfast. Here may be seen three or four solfataras at intervals of about 200 yards, and a rocky cauldron of ever-seething, slopping, bubbling and boiling grey mud, resembling lead paint. There are more solfataras on the other side of the hill. This mud cauldron is said to be thirty feet deep; and it is a characteristic of all the hot and steaming pools in this formation, here and elsewhere, to be of great depth, often ninety feet and upwards. There are, likewise, rounded beds of sulphur, mud, and ferruginous deposit, which will not bear the weight of anyone attempting to traverse their heated crust. The rivulets from the hot pools wend their way through deep banks down the valley, leaving oxide of iron on the stones in the bed of the stream and on their margin in their course. My friends started in advance of me about noon to ride as quickly as might be on their return journey to Reykjavik, guided by the farmer who had escorted us on the preceding evening as far as Hafnafiord. I followed them a little after 2 o'clock, but a perfect storm of wind and rain set in, and continued all day, accompanied by hail on the top of the hills, where wind ensued of such force as to cause us to swerve on our ponies. We took the near but very steep road on the hill, with a slope of loose lava, like a colossal ash-pit, of 100 feet or upwards on our left and 50 feet on our right, and after a deep descent passed by a volcanic lake on our left. This route brought us back into the homeward road by a somewhat shorter cut. During this expedition I gathered some leaves of an alpine plant, the *Rubus chamæmorus*, or cloudberry, which I had not seen for many a long year. Thoroughly wet through, chilled, and shivering we reached Hafnafiord late in the evening; and, after remaining some time there to rest and take refreshment, arrived at Reykjavik after midnight.

Early on the morning of July 29th we anchored off Patreksfjörður (lat. $65^{\circ} 35'$, N., long. $23^{\circ} 57'$, W.), on the west coast of Iceland. This is a very neat little place, but consisting only of a few scattered houses along the shore, and immediately at the base of steep and lofty hills, whose slides of lava-shale extend almost to the beach. After landing here I spent an hour or so in collecting Coleoptera, of which I found several under stones in a field adjoining the beach.

On resuming our voyage the same morning, at 11 o'clock, we pass table-shaped hills, of which the upper portion consists of

rocky ridges, and the lower of slopes of shale, frequently variegated by strips of greensward, alternating with red tufa, which is in its turn succeeded by loose grey basalt. The same description of scenery continues for a considerable distance; and on the tops of the hills, as previously, frequent patches of snow occur. Of course its total disappearance, or the contrary, varies according to the warmth of the summer season in different years. This summer, and the last one also, are considered to be very fine ones for Iceland. Arnarfjordur (lat. $65^{\circ} 41'$, N., long. $23^{\circ} 35'$, W.) was next reached, or, more strictly speaking, Bildudalur, as this is the name of the head of the bay in the said fjord in which our vessel anchored, from the establishment of a thriving Icelandic merchant there; in fact, his dwelling, factory, cottages, and homestead constitute the whole of the place. As his wife was one of our passengers up to this point, he came off to the steamer in his boat not long after our arrival. I observed very few Coleoptera under stones at Arnarfjordur. Geometridæ, on the other hand, proved plentiful on either side of a wall that divided the sloping meadows here, as well as along the banks of a watercourse from the hills. I caught probably three or four species, but the large majority belonged to one kind.

The plateau of Glama glacier meets our view far ahead as we approach Dyrafjord (lat. $65^{\circ} 53'$, N., long. $23^{\circ} 28'$, W.) on July 29th. The summits of the snow-streaked hills adjacent to the shore terminate in more pointed peaks, and have generally a more alpine appearance. The houses of Dyrafjord are scattered along the line of coast, and are chiefly of wood, painted brown, with roofs of shingle. I went ashore in the evening, and found Geometridæ very abundant.

On July 30th we reached Isafjordur (lat. $66^{\circ} 6'$, N., long. $23^{\circ} 7'$, W.), after visiting several other places. The clouds hung low upon the mountains next morning. The heights that environ the head of this fjord sweep more gradually to the shore than is by any means always the case in these regions, and terminate in grassy slopes, on which cattle were feeding. Geometridæ are decidedly scarce here, at least on the particular mountain slope that I visited when I went ashore that morning, probably owing to the dearth of flowers in that spot, for the day turned out a beautiful one, warm and sunny.

Mr. Hugo Ruben, from Copenhagen, one of our fellow-passengers, was the companion of my walk this morning, and kindly assisted me in collecting a few Coleoptera. The scarcity of flowers—very few besides gentians, wild thyme, and cotton-grass—was very noticeable at Isafjordur, owing no doubt to its northerly position.

Reykiafjordur (lat. $65^{\circ} 58'$ N., long. $21^{\circ} 27'$ W.). I came on deck at 6 a.m. on August 1st, just as we were passing Cape North,

the north-west point of Iceland, at the distance of a mile and a half from the shore, and within the arctic circle. The cliffs of Cape North are not very lofty, but precipitous, and going down sheer into the sea, completely flat-topped, and with clouds brooding low upon their summits. These heights are mostly of a grey tint, with red and brown patches here and there, without fissures, ravines, or projecting points, but presenting a uniform wall of rock, with ledges of greensward seawards. A short distance eastward, where the greensward dips into a hollow, and the cliffs are lower in consequence, there are two places where two waterfalls respectively leap over the brink into the sea, descending from the Dranga glacier. A thick fog over the sea prevailed for a considerable time this morning, but the weather became clearer after mid-day, about which time we entered Reykíafjörður, whose inhabitants are said to be the poorest in all Iceland when the ice-floes prevent them from betaking themselves to their lucrative fishing-grounds, and great hunger and distress prevail; but they are correspondingly thriving when they can pursue their ordinary avocation, so completely does their subsistence depend on their fisheries. Reykíafjörður is small and narrow compared with other arms of the sea, and its village similarly consists of very few houses. A few Coleoptera are to be obtained by searching under stones; but though there are decidedly some flowers and more varied kinds of plants than at Ísafjörður, I saw no Geometridæ whatever, and only one *Crambus* and one *Phrygania*. My own idea is that we have passed the limit where most species occur, and are now too far north to meet with many. The said limit I should be inclined to place between Innuundafjörður and Ísafjörður, possibly somewhere about fifty miles south of the arctic circle. Some inmates of a house, where we were invited to sit down, and given a draught of good milk shortly before our return to the steamer, attributed the absence of insects to the day not being a sunny one, and stated that there had been several moths. Part of yesterday at Ísafjörður, however, turned out very fine and warm during my walk, yet I did not see half a dozen Geometridæ; and of course certain species must have their limit somewhere, as in our own land,—a limit traceable to climate, and not always depending on the food-plant (as though the insect cannot continue to exist apart from the food-plant, yet the food-plant may be found without the insect). I gathered a species of grass new to me this morning. At Reykíafjörður may be seen many barrels and vats for holding the whale-oil, also large sections of whalebone from the animal's palate, and large masses of blubber drying in the sun, round which several specimens of *Calliphora vomitoria* were buzzing, and others lying lifeless on their backs on the surface of the blubber, either from their wings and legs having become clogged with the oil (and this is the most

probable supposition), or from the ammonia in the flesh of the whale being too strong, even for what are ordinarily regarded as scavenger-flies.

Fog-horn sounding early on the morning of August 2nd, and a smart shower of rain, at Skagestrand (lat. $65^{\circ} 50'$, N., long. $20^{\circ} 18'$, W.), at which place the hills recede from the coast, are smaller in dimensions, and consisting of far more gradual and easy means of ascent, being for the most part grassy slopes, as far as I can judge from the steamer. The clouds are still resting on their summit. Skagestrand apparently only consists of a dozen or so farms or cottages, scattered here and there over a level green plain adjacent to the sea, and in front of the hills. As it was a damp and foggy morning, and our stay here only a short one, I did not land. About 9 a.m. we are again on our way towards Saudakrog (Saudakrok in Icelandic) (lat. $65^{\circ} 45'$, N., long. $19^{\circ} 38'$, W.), but continue to proceed very slowly in consequence of the fog. Drangey, so famous as the place of residence of the hero Grettir and his brother, and their death at the hands of their foes, is a rocky mound of an island, with precipitous cliffs on every side, seemingly impregnable, had not the ladder, according to the Saga, been left in position against the rocks, whereby his enemies scaled the place. It is now uninhabited, but is productive as regards the number of sea-birds in it, and the fish around. A little further away the large island of Malmey is passed, where Malmey, an outlawed bishop, who had been driven by his enemies from the land, resided; and his retainers, in retaliation, killed them at Holar, his old episcopal seat of residence, about A.D. 1300, being as fierce as his enemies themselves in those wild times. The cliffs of Drangey are whitened all over in many places with the guano of sea-birds, and in close proximity to them stands a pointed, insulated rock, known as the "Old Man"; it is said there was another in its vicinity, termed the "Old Woman," which has long since fallen into the sea. Saudakrok presents a very neat appearance, and extends along the sea-beach, with gradually sloping cliffs, or, more strictly speaking, steep banks, with their surface everywhere strewn with shale and loose stones. On landing, I strolled up the bed of a dry watercourse, where I collected some of the stones, being struck with the variety of their colour and markings. Arrived at the moor above, I found it covered with stones, grassy hillocks, and an abundance of the plants of *Dryas octopetala*, by this time all gone to seed; captured one *Noctua* on *Thymus serpyllum*, and obtained some Coleoptera under stones; also some *Calliphora*, then in a semi-torpid state, that had crept there for shelter from the damp weather. Three Geometridæ also seen.

(To be continued.)

CONTRIBUTIONS TOWARDS A LIST OF THE VARIETIES
OF NOCTUÆ OCCURRING IN THE BRITISH ISLANDS.

By J. W. TUTT, F.E.S.

(Continued from p. 233.)

Mamestra, Och., *brassicæ*, L.

The type of this excessively abundant and widely-distributed species is described by Linnæus, in the 'Systema Naturæ,' 10th edition, p. 516, No. 111, as follows:—"Noctua spirilinguis cristata alis depressis cinereo nebulosis: unco nigro supra maculam priorem." In the 12th edition, p. 852, No. 163, he adds, "Stigmata alæ ordinaria punctis albis notata et margo inferior punctis 3 albis." It must be noted that no mention is made in the Linnæan description of a subterminal line, and mention is made of three white dots on inner margin. My specimens have one or two of these dots present, not three, and I have specimens in which the subterminal striga is practically obsolete; the "uncus" is well seen around the claviform, and there are traces in some specimens of another around the lower part of the orbicular. It would appear that we rarely get specimens satisfying the Linnæan description of the type, our specimens being principally referable to var. *albicolon*, St. Guenée, in his 'Noctuelles,' vol. v., pp. 198, 199, says of the variation of this species:—"It varies a little both in colour and markings, but I have never seen a distinct race. *Albidilinea* of Haworth has the reniform and subterminal line well marked in white; *Albicolon* of Stephens is, on the contrary, of mixed colours, with the claviform obliterated; lastly, the figure *d* of Engramelle has a yellow ochreous tint. These last specimens are generally smaller than the type." Regarding this ochreous form, Mr. Dobrée has specimens, a description of which he has kindly given me (*vide* var. *ochracea*). In England we appear to get three fairly distinct forms:—(1) Ashy grey, mottled with darker on the costal margin and with ochreous on the inner (the ochreous often with a reddish tinge), with distinct stigmata and subterminal line, = var. *albicolon*, St. (2) An almost unicolorous blackish grey form, with all markings and lines, except reniform, almost obsolete, = var. *unicolor*. (3) An intensely black form, with very distinct white subterminal line and reniform, = var. *albidilinea*. Hübner figures (88) the pale form under the name of *brassicæ*. Mr. Gregson, 'Entomologist,' iv., p. 52, writes:—"Of this constant and abundant species I dare not say how many I have carefully secured, and the results are before me:—One very small perfect specimen; one of a smooth rich brown colour and without markings, a large specimen; and two large females having full white stigma, and a rich, distinct, wavy, light striga near the outer edge. These are very striking

insects." I have a very small specimen, but have never seen one that could be called really brown, so that Mr. Gregson's specimen must have been a very unusual form. Taking the mottled grey insect as the type, we have the following forms:—

1. Ashy grey, mottled with darker, no ochreous colouring, white reniform, subterminal line more or less obsolete, = *brassicæ*.

2. Grey, mottled with ochreous, distinct stigmata and subterminal line, = var. *albicolon*, St.

3. Ochreous grey, mottled with darker, white reniform, subterminal line present, = var. *ochracea*.

4. Unicolorous blackish grey, white reniform, obsolete subterminal line, = var. *unicolor*.

5. Very black, white reniform, white subterminal line, = var. *albidilinea*, Haw.

α. var. *ochracea*, mihi.—This is the fig. *d* of Engramelle, 456. Hübner's figure (88) may be described as:—"Anterior wings pale ochreous, with darker fuscous shades; all the characteristic lines and markings of *brassicæ* of a pale whitish ochreous. Hind wings grey, margin darker than base, lunule distinct." None of our British specimens appear to be referable to this variety. Mr. Dobrée, however, writes:—"I have specimens from Amurland, where it is very common. These are of quite a pale, warm ochreous ground colour, with typical faint markings. Reniform white, and more compact than in British specimens, and outlined with black. Orbicular, the same as ground colour, with strong black outline, and beneath the orbicular a conspicuous semicircular black mark facing inwards; the subterminal line almost obsolete" (*in litt.*).

β. var. *albicolon*, St.—This would appear to be the more common form of *brassicæ* in the southern part of England, being mottled with ochreous and dark fuscous, and with distinct stigmata and transverse lines outlined in pale ochreous. Stephens' *albicolon*, however, had an "obliterated claviform," which is not usually the case with the mottled variety.

γ. var. *unicolor*, mihi.—Anterior wings dull blackish grey, with the subterminal line almost obsolete, the markings, blending with the dark ground colour, give it a very unicolorous appearance. The outer edge of the reniform white, as in the type. My specimens are labelled Nottingham and Westcombe Park, but I dare say it is found occasionally wherever the type or var. *albicolon* is abundant.

δ. var. *albidilinea*, Haw.—Haworth's description of *albidilinea* is as follows:—"Alis anticis nigricantibus, striga postica alte bidentata albicante." "Statura et magnitudo fere *N. brassicæ*. Alæ anticæ stigmatibus ordinariis, strigâque alte dentatâ juxta marginem posticum albicante, exacte ut in Noctuis vulgo dictis 'Brocades.'" This extreme variety is, I believe, rare. I have only one of this intensely black form with distinct white markings. My specimen was bred from pupæ, sent me by Mr. Mottershaw, of Nottingham. Mr. Robson, in the 'Young Naturalist,' vol. ix., p. 103, referring to Mr. Gregson's specimens, mentioned above, describes them, and I have very little doubt they belong to this variety. I have seen a specimen of Mr. Robson's belonging to this variety, but the subterminal line is more ochreous than white. I would include all black specimens with strongly-marked reniform and subterminal line under this varietal name.

s. var. andalusica, Stdgr.—Dr. Staudinger has a variety in his 'Catalog' under this name, which he describes as, "dilutior, magis unicolor." I thought that probably this variety might refer to my var. *ochracea*, as this short description is so vague that it is impossible to tell from it to what form Dr. Staudinger refers. Mr. Dobrée, however, in answer to a query, writes:—"Andalusica is certainly not the Amur type. It is merely the pale form so constantly occurring in all continental, as opposed to British, Lepidoptera, the ground colour of the Amur type (*vide* above) is ochreous, but that of *Andalusica* is grey" (*in litt.*).

Mamestra, Och., *persicariæ*, L.





This species, as far as my knowledge extends, appears to be very constant in Britain. I find a slight variation in the amount of ochreous colour in the white discoidal, some variation in the extent of the orbicular being obsolete, and rather more in the character of the subterminal line. I have some in which this latter is obsolete, others in which it is represented by a more or less complete series of ochreous dots, and one only in which it is quite complete. On the Continent, however, it appears to be more variable, at any rate, so far as the discoidal is concerned; in some specimens it is ochreous, and in others only of the ground colour. The former is, according to Guenée, the *accipitrina* of Esper, the latter the *unicolor* of Staudinger, although, as mentioned below, Dr. Staudinger considers *accipitrina* a distinct species. The type of this species is described by Linnæus, 'Fauna Suecicæ,' pp. 319, 320, No. 1208, as:—"Noctua spirilinguis cristata, alis fusco-nebulosis: macula reniformi albo papilla lunari flavescente." "Alæ superiores fusco nigricantes, venis nebulosæ, margine postico quasi dentato atomis albis. Inferiores antice pallidæ, postice fuscescentes margine albedo. Subtus omnes glaucescentes: fascia lata, obsoleta et puncto nigro. Anus ferrugineus"; and in the 'Systema Naturæ,' p. 847, we read, "Alarum superiorum margo posticus albo-dentatus." Our specimens have an ochreous subterminal line, not "white."

α. var. accipitrina, Esp.(?)—Of this variety there are specimens in the Doubleday collection (continental), with "the reniform ochreous, and the whole insect much less strongly marked." Guenée says of it:—"Accipitrina, Esp., pl. 129, fig. 4, appears, after what he himself states in his text, to be a purely accidental and very singular variety of *persicariæ*." Dr. Staudinger, in his 'Catalogue,' says:—"Accipitrina of Esper is another species, the var. *accipitrina* of collections is not Esper's *accipitrina*." He then suggests for the *accipitrina* of continental cabinets the varietal name of *unicolor*.

β. var. unicolor, Stdgr.—Of this variety, Staudinger says in his 'Catalog,' "Al. ant. absque macula alba." Mr. Dobrée writes:—"I have specimens of this variety in my collection. It seems to be a common continental variety" (*in litt.*).

APAMEA, Och.

The genus *Apamea* brings us face to face with the great difficulty of dealing with our *Noctua* varieties, for in this genus

we have the first of those protean species where the ground colour varies through several shades of colour, and where the markings are so variable, and yet recurring with such frequency in the various forms, that it is no wonder our early lepidopterists thought they had many distinct species. Taking the first two species, *basilinea* and *pabulatricula*, we have two of the most constant species in the genus, *basilinea* being ordinarily characterised by no special markings, but being generally of an almost unicolorous hue with transverse lines, while *pabulatricula* is characterised by a strongly-developed black longitudinal mark directly under the stigmata. The two forms—represented by these species—give a basis on which the development of the variation in the other species appear to proceed, *viz.*, (1) an unicolorous form with transverse lines, and (2) a more variegated form with a dark longitudinal streak under the stigmata. The species of this genus may be looked upon as having the anterior wings divided into three parts,—the basal area, the median area, and the outer area. The first and last of these have transverse lines crossing them, the second contains the stigmata, and under this, in some species, is a very dark longitudinal -shaped mark (a modification of the claviform). These may be looked upon as the great characters of the variable members of the genus, the variation consisting principally of the development (in some cases to a very high degree) or non-development of this particular mark. Thus, in the variable species *gemina*, we find all the different phases of variation to consist of two types: one, in which the transverse lines are developed, and the species has a particularly reticulated appearance; the other, in which the -shaped mark is highly developed, the transverse lines more or less suppressed, and the median space more or less intensified in its upper half in colour. But just as *basilinea* and *pabulatricula* exhibit single forms of a different type, and *gemina*, on the other hand, exhibits these types blended into one with intermediate forms, so we have in *unanimis* an almost purely dimorphic species, where one form is reticulated and the other with the -shaped mark, and yet there is no extreme development of either form, as in *gemina*. We now come to another constant member of the group,—*ophiogramma*,—with its characteristic dark costal mark, and then we reach, what appears to me, to be the most aberrant* member of the group, *leucostigma*, where the transverse lines are reduced to a minimum, where the  mark is rarely developed, but where we get a perfectly new form of variation,—a dark unicolorous form with no markings whatever, except the variable yellow or white reniform stigma. And then comes *didyma* (*oculea*), one of the most protean species

* This is an *Apamea*, undoubtedly, from its markings, but the shape of the wings is different to the other members of the group. It appears to have close characters with *Hydræcia*.

in the whole group, and it is almost impossible in this species either to classify or tabulate the numerous forms, for not only have we every possible variety that can be compounded of the *basilinea*- and *pabulatricula*-like forms, but these are combined with *ophiogramma*-like forms with a result that defies classification: we have in grey, ochreous, and red colour the transverse lined or reticulated form; we have in each colour the \equiv -marked form; we have in each colour an *ophiogramma*-marked form (dark costa), blended with the other forms of variation into every possible intermediate form; and, lastly, we have the unicolorous *leucostigma*-like forms in grey, red, and black.

Apamea, Och., *basilinea*, Fab.

This species is very constant in its markings for a member of such a variable genus, but the ground colour varies from a pale whitish ochreous, with transverse lines and stigmata still paler, to a deep, almost unicolorous, reddish brown form, some specimens being of the pale or a darker ground colour, with the median area reddish, the other parts of the wings being also suffused. This intermediate form would appear to be the type from the description of Fabricius, which is as follows:—"Noctua cristata alis deflexis fuscis griseis undatis, lineola baseos atra, thoracis crista bifida." "Color variat ferrugineis griseisque, distincta lineola parva flexuosa atra baseos. Antennæ albidæ." Guenée ('Noctuelles,' vol. v., p. 206) mentions an allied species under the name of *finitima*, which Mr. Dobrée assures me is only a climatic variety of *basilinea*. It would appear that this species is subject to a good deal of colour variation, according to its geographical range, as the Huddersfield and Hartlepool specimens are generally somewhat different in ground colour to the South of England forms.

a. var. pallida, mihi.—Ground colour of the anterior wings pale ochreous grey, not "fuscous," with still paler transverse lines, and no ferruginous or reddish clouds, otherwise like the type. The palest form I have seen of this species came from Mr. Russ, and was captured at Sligo.

β. var. unicolor, mihi.—The ground colour of a dark reddish brown, with a slight purplish tint; the orbicular scarcely traceable; the reniform indistinct, but outlined in a slightly paler hue than the ground colour; the subterminal line just traceable. Hind wings very dark grey, nervures dusky, lunule indistinct. Captured in Westcombe Park, June, 1886. Mr. Porritt writes:—"Reddish brown forms occur not uncommonly at Huddersfield, quite different to the southern clay-coloured specimens" (*in litt.*); and again he writes ('Transactions of Yorkshire Naturalists' Union,' part vi., p. 76), "I have taken some very beautiful strongly-coloured specimens at Huddersfield"; so that what would appear to be a very unusual form in the London district is closely allied to the ordinary one at Huddersfield.

γ. var. nebulosa, Vieweg.—Vieweg, in his 'Tabellarisches Verzeichniss, &c., pl. i., fig. 6, figures a variety under this name. It has "The anterior

wings pale ochreous grey, with the costal area reddish, the red colour extending half-way across the wing from the base to the reniform, and then going off to a point at the costa; the characteristic basal streak of *basilinea* is present, and there is a double black basal line; claviform and reniform outlined in black, but orbicular indistinct; lower half of reniform dark. Hind wings dark grey, with paler base and darker nervures." Vieweg's diagnosis, p. 55, No. 84, is:—"Cristata, alis deflexis cano fuscoque variis, litura baseos marginisque tenuioris nigris." In his further description in German we find:—"The lower part of the outer reniform filled up with blackish shading. Besides the black streak on the fold there stands close to the inner margin, about the middle of the wing, a small narrow spot of the same colour, which forms a chief mark by which this moth may be recognised."

δ. var. *cinerascens*, mihi.—Anterior wings of a dull ashy grey, with no trace of the ferruginous markings of the type; the subterminal line of a paler shade of the ground colour; the double basal lines and stigmata of the ground colour, outlined in brown; the reniform internally edged with paler. Hind wings of the same dull colour as the anterior. I have seen no specimens like these, except from Hartlepool. Mr. Robson sent me six specimens, of which three were typical, and three of this dull, almost unicolorous, form. Probably this variety is widely distributed in the most northern parts of Britain.

♂. *finitima*, Gn.—Guenée (as mentioned above) considers this as a distinct species, and writes:—"This replaces, in the United States, our *basilinea*, which it closely resembles. It is of the same size; the ground colour of the superior wings less reddish, and more white; the median space is, on the contrary, more strongly marked with reddish brown, especially on the upper part; the median lines are more strongly marked in black, as well as the claviform, which is very distinct." Mr. Dobrée, to whom I am so greatly indebted for information, writes:—"The *Hadena finitima* of North America is only a climatic variety of *basilinea*. The chief differences are that the general colour is of a pronounced vinous tinge; in some the space between the median lines is darker, so as to make a distinct band across the wing, which includes the stigmata; in others, the dusky line, from the stigmata to the inner margin, is more pronounced than in the generality of English specimens. In support of my belief, I have collected numerous specimens from English localities, and in some few of them, especially from Yorkshire and Newcastle, both the vinous tinge, as well as the distinct band of the North American insect, is quite perceptible" (*in litt.*).

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

LEUCOPHASIA SINAPIS.—I have captured many specimens of this species during June. *Melanarge galatea* was to be had in the district, but seems confined to a very small area.—(Mrs.) M. CRASKE; Newacott, Bridgerule, Holsworthy, Devon, August 26, 1889.

COLIAS EDUSA.—This butterfly has not been uncommon during the past year, and several records have from time to time been received of its capture; among them are the following:—

Essex.—I observed several, some of which I caught, at the end of August and early in September, in clover-fields in several localities in South-east Essex.—JOHN T. CARRINGTON.

Surrey.—I have to record the capture of *C. edusa* on Riddlesdown on the 6th of this month. I have been looking out for more, but have failed to see any up to this date. I thought perhaps we might be going to have a busy season with them by this one being so near London.—C. J. BODEN; 228, Bermondsey Street, London, S.E., September 23, 1889.

Isle of Wight (Ventnor).—While at Ventnor I had the pleasure of taking five males and one female off the above, August 13th, 14th and 19th; no doubt I should have taken more if the weather had not been so rough. W. E. BUTLER; Chatham Street, Reading, September 13, 1889.

Berkshire.—Since returning to Reading I have taken three males, and know of about fifteen being taken here. As I have not taken it here for some years, I thought it would be of interest to some of our brother entomologists.—W. E. BUTLER; Chatham Street, Reading, Sept. 13, 1889.

Gloucestershire.—On Tuesday, Sept. 10th, Mr. A. C. Renwick, of Churchdown, saw several specimens of the above insects, hovering over ragwort on the railway line and in the fields adjoining, about two miles from Gloucester; he succeeded in taking one male; he had previously taken another. On Thursday, the 12th, Mr. S. W. Lane, of Brunswick Square, Gloucester, took a fine female whilst out shooting; as he had not his net he was only able to secure one. There are several reported captures, but the above are the only ones which I am able to authenticate.—M. STANGER HIGGS; The Mill House, Upton St. Leonards, Gloucestershire.

Devonshire.—During the second week in September a few specimens turned up in South Devon.—(Rev.) J. E. TARBAT; Whitley, Reading.

South Wales.—At a meeting of the Penarth Entomological Society, held on Tuesday, Sept. 10th, among other specimens exhibited were between twenty and thirty *Colias edusa*, these having been caught in this district since the beginning of August. Altogether about fifty have been captured thus far. It may interest your readers to know that *C. edusa* appears to abound about here for the first time for ten or twelve years. *Vanessa cardui* has been very abundant also this year. *Plusia gamma* has not been nearly so plentiful as last year. Sugaring has been very little use, and, generally speaking, insects have not been plentiful.—G. A. BIRKENHEAD, Hon. Sec.; Downs View, Penarth, near Cardiff, September 13, 1889.

Durham.—On September 2nd I saw a specimen of *C. edusa* near Durham. I am told it is some years since any have been observed in this county.—H. J. CARPENTER; Observatory, Durham.

COLIAS HYALE NEAR READING.—Early in September I saw a specimen of *Colias hyale* near this town.—(Rev.) J. E. TARBAT; Whitley, Reading.

LIMENITIS SIBYLLA VAR.—Whilst capturing some specimens of *Limenitis sibylla* in the New Forest this summer, I caught a variety which had the white entirely absent and was uniform black-brown, the underside consequently had not white, but was of brown turning to bluish grey near the body.—W. W. WALL; Spring Bank, Shirley Warren, Shirley, Hants, July, 1889.

APATURA IRIS. — I took this year a specimen of *Apatura iris*, settling on a clod of earth. At the time there was no apparent reason for its choice of alighting place, but resting on the spot two days subsequently, a most offensive smell became evident, which, on inspection, proved to arise from the decomposing remains of a snake, partly hidden by grass, a few inches away from the clod. — JOHN T. WINKWORTH; 22, Wallwood Street, Burdett Road, E., August 9, 1889.

VANESSA ANTIOPA IN ESSEX. — I captured on September 4th, in a garden in Wallwood Road, Leytonstone, a fine specimen of *Vanessa antiopa*. — G. C. FRINDELL; 20, Wellesley Road, Leytonstone.

VANESSA ANTIOPA AT CROYDON. — On the 14th September a friend came over and said he had seen a black butterfly bordered with yellow. I took my net at once and found it was sitting on a conservatory. It was high up, but I made a hit at it and missed; my friend saw where it flew to and we secured it. There were two or three plum-trees about and some fallen fruit. — SYDNEY C. HOVENDEN; Oaklands, Haling Park Road, Croydon, September 17, 1889.

VANESSA ANTIOPA IN SUSSEX. — My brother captured a specimen of *V. antiopa* here last week. This is the second specimen we have taken, as I caught one in August last year, near the same spot. — F. A. MULLENS, Jun., Westfield Place, Battle, August 31, 1889.

EPINEPHELE HYPERANTHES VAR. ARETE. — While working the same ground (S. W. Berks) where last year I took five specimens of the var. *arete* of *Epinephele hyperanthes* (as recorded in the 'Entomologist'), I have this year captured three more of the same variety. In a subsequent issue (Entom. xxii. 20), Mr. T. D. A. Cockerell suggested that experiences of others might prove that the damp summer of 1888 had much to answer for in modifying the normal markings of our butterflies. While admitting the possibility of last year's developments perpetuating their peculiarities, yet, to my mind, my latest captures rather point to a strain of this variety existing. — JOHN T. WINKWORTH; 22, Wallwood Street, Burdett Road, E., August 9, 1889.

POLYOMMATUS PHLÆAS VAR. SCHMIDTII. — Yesterday, on Dartford Heath, I captured a specimen of *Polyommatus phlæas*, having the usual copper colour replaced by almost pure white. Unfortunately it is damaged, as I had nothing but my hat to effect its capture. — CLEMENT T. YOUENS; Tower Cottage, Dartford, Kent, August 26, 1889.

SPRING RHOPALOCERA ON THE RIVIERA. — Mr. Norris's article, "On the Spring Butterflies at Hyères (Entom. 182), should be useful to intending visitors to the Riviera. A list of a few additional species I have found in Cannes and the neighbourhood, which Mr. Norris does not appear to have met with at Hyères, may serve as a supplement to his notes. Down to *Pieris daplidice* our lists agree, the var. *bellidice* (?) I have once met with. *Euchloë belia* var. *ausonia*, is common in May. Aberrations of *Leucophasia sinapis* I have sought for in vain. *Thecla spini* and *T. w-album* (one specimen), I have caught in the neighbourhood of Cannes, in the first days of June. Several of the former were flying round an oak-tree on a hot moor at mid-day. *Thestor ballus* does not belong to the Cannes fauna,

Lycæna bætica and *L. telicanus* are by no means common at Cannes. Both fly on warm sunny days about the beginning of December. In 1885 *L. telicanus* was to be seen hovering about in the woods, and for a few days there were a great many to be seen; they all disappeared, however, about a week after their first appearance. There is a second brood later in the year, I believe, but certainly not before July. *L. orion* (*battus*): one specimen taken on the 13th May, 1884. *L. icarinus*: occasionally met with in May. *L. corydon*: excessively common in Cannes; rather larger than the northern type, as is also *L. adonis*. Of the former I have captured one specimen of the rare aberration *semi-brunnea* (Mill), on the 19th May. *L. doryllas*: three males on the 1st of June, 1886, inland, in a torrent-bed in the same locality as *L. sebrus*. *L. minima* (one specimen) and *L. semi-argus*. *L. melanops*: common wherever *Dorycinum suffructicosum*, its food-plant, grows. *Nemeobius lucina* and *Libythea celtis* are both blanks on the Cannes list. My *Charaxes jasius* have generally emerged during the second week of June, so that the first half of May is unusually early, even for bred specimens. *Apatura ilia* ab. *clytie*, I have never seen at Cannes. *Vanessa egea* occurred more frequently this year than usually. It is very common at Mentone in March. I have found larvæ of *V. urticæ* in abundance, both on nettle and hop. They did not reach the perfect state till late in the season. *Melanargia galatea* var. *procida*: local, and a little later than *syllius*. *Argynnis dia*: very common this year at Cannes. *Epinephele pasiphaë*, I have not met with. *Spilothyrs althææ* and *S. lavateræ*: rare. *Syrichthus orbifer* I do not think we take, but on the other hand, *S. alveus* (var. *fritillum*), is abundant and *S. carthami* is occasionally met with. Three other skippers are also found, especially on roadsides; they are *Pamphila thaumas* and *P. lineola*, and a third which I take for *P. actæon*, though larger than the British type. All the other insects mentioned by Mr. Norris are common to both Cannes and Hyères. During the summer *Satyrus circe*, *hermione*, *briseis*, *statilinus* and *arethusa*, and *Epinephele ida*, are common. The *apollo* and many species of *Erebia* and *Polyommatus*, are common on the hills, as is also *Lycæna arion* and some others of the genus. A Russian species, *L. cælestina*, was re-discovered some years ago at St. Martin Lantosque, where also the scarce *Papilio alexanor* is found. *Argynnis pales* is also found near Cannes.—J. C. WARBURG; 8, Porchester Terrace, W.

SPHINX CONVULVULI.—The following notices of the capture this season of *Sphinx convolvuli* have been received:—

Middlesex.—I observed recently in the Regent's Park Gardens, a large hawk-moth,—I think *S. convolvuli*, without doubt,—hovering over plants of scented white tobacco.—W. H. TUCK; 47, Cathcart Road, South Kensington, September, 1889.

Berkshire.—A very fresh specimen of this insect was brought to me on August 31st, which had been found resting on a garden railing in Reading. Two years ago the moth appeared somewhat plentifully in the neighbourhood.—(Rev.) J. E. TARBAT; Whitley, Reading.

Hants.—I have in my possession a large female specimen of this insect, which was found at rest by day on Sept. 10th; it is in fine condition and seems of a darker colour than usual.—J. M. ADYE; Somerford Grange, Christchurch, September 17.

Oxfordshire.—On August 26th last, at 8 p.m., I took, hovering over scented tobacco plants, a specimen of *S. convolvuli*.—H. T. BLISS; Chipping Norton, Oxon.

Glamorganshire.—It was my fortune to capture a good specimen of *Sphinx convolvuli* on the night of September 11th, about half-past eleven, hovering over the flowers of a balsam I have growing in my garden. I hear my friend Mr. Allen, of Porthkerry, about seven miles from here, caught two *S. convolvuli* about a fortnight since, hovering near some sweet-scented tobacco plants.—G. A. BIRKENHEAD; Downs View, Penarth, near Cardiff.

Lancashire.—On August 24th I had a large *Sphinx convolvuli* brought to me by a friend. It was caught by his gardener, settled on the wall of one of his greenhouses in his garden at Didsbury, near Manchester. The same night another was seen, and again on the 25th, both times flying over the flowers of the white tobacco plant. On the 26th I went with the hope of catching it and succeeded.—T. G. MASON; 8, Landsdowne Road, Higher Crumpsall, Manchester, September 16.

Aberdeenshire.—A fine specimen of *Sphinx convolvuli* was taken here on August 27th, 1889. There are always one or two taken here every year.—L. G. ESSON; 46, North Charlotte Street, Aberdeen, N.B.

SPHINGIDÆ IN KENT.—On August 22nd I captured a fine female specimen of *Sphinx convolvuli*, hovering over the flowers of *Nicotiana affinis* (tobacco-plant). I took a second specimen at the same place on the 31st, a male, in fairly good condition. I might also mention that I was fortunate in finding a larva of *Chærocampa porcellus* and also one of *Acherontia atropos* in this neighbourhood; both of them have retired underground to effect their transformation.—THOMAS WILLSON; Dudley House, Ramsgate, September 4, 1889.

ARCTIA CAIA. — I have bred over 700 imagines of *A. caia* without obtaining a single striking variety. One had hindwings nearly all yellow, and several had all the black spots banded into bars. These larvæ were fed on white parts only of lettuce and cabbage.—W. H. TUNLEY; 41, Chichester Road, Landport, September 16, 1889.

MALFORMED LIPARIS DISPAR. — I have bred a good many males of *Liparis dispar* with a rounded piece taken out of one or both hind wings; is this common? — W. H. TUNLEY; 41, Chichester Road, Landport, September 17, 1889.

[In Entom. vol. xi., p. 170, is a reference to this peculiar malformation which is figured in the coloured plate, to which the reference belongs. It is there stated that "Mr. Enock bred in 1887 upwards of eight hundred males and females of this species, and nearly all had the underwings notched as seen in the illustration." In his papers upon "Variation of Insects," Mr. Cockerell (Entom. 149) remarks upon this form.—J. T. C.]

STAUIOPUS FAGI IN WILTS.—Mr. Searancke's note in the last number of 'The Entomologist' (Entom. 212) has reminded me of another locality for *S. fagi*, which I believe is very little known to entomologists, viz., Groveley Wood, near Salisbury. I took three *S. fagi* there in 1887, on the 2nd, 4th, and 13th of July, and a friend of mine took another. I had very little opportunity of working the wood, but I believe if thoroughly worked it would yield some good species.—LEONARD S. SELLON; Davos-Platz, Switzerland.

DICRANURA VINULA.—Whilst searching for larvæ on some willow trees in this district, on the 20th of July, I found four nearly full-grown larvæ and, at the same time, several ova of *Dicranura vinula* on the same tree. The four larvæ pupated during the first week of August, but the larvæ reared from the eggs are still feeding and have not yet moulted for the last time. I see that Stainton gives July and August as the times of appearance of the larva of this species, but the larvæ which I found on the 20th July must have hatched about the 1st or 2nd week in June. I may add that I found a larva on poplar on the 19th June, which had moulted for the second time. I also found (in 1888) several *vinula* larvæ, still quite young, as late as the 19th of September.—H. D. SYKES; The Cedars, Brigadier Hill, Enfield, August 26, 1889.

ACRONYCTA LEPORINA IN PERTHSHIRE.—I have to record the capture of several fine larvæ (some nearly full-fed) of *Acronycta leporina*, taken near Tummell Bridge, Perthshire, last month. I had believed *leporina* to have been a southern insect.—MRS. CROSS; The Vicarage, Appleby, Doncaster, September 11, 1889.

ACRONYCTA ALNI (LARVA) IN GLOUCESTERSHIRE.—Whilst out shooting on August 7th I captured a very fine larva of this rare species. It was crawling on my neck, so I am unable to say what its food-plant could have been. There were only fruit trees in the field where I found it. There is no mistaking its identity, as the habits and appearance of the larva are so characteristic. Its length is 33 mm. at rest, and the spines on the second segment are 5 mm. long. I can find no record of larvæ of *A. alni* having been taken in Gloucestershire before.—M. STANGER HIGGS; The Mill House, Upton St. Leonards, Gloucestershire.

STILBIA ANOMALA IN LANCASHIRE.—While mothing here one afternoon in August, I disturbed a nice female *S. anomala*, which is the first I have taken or seen here.—H. MURRAY; Lowbank Villa, Carnforth, September 14, 1889.

TRIPHÆNA ORBONA IN HANTS. — I have the pleasure to record the capture of a good specimen of *Triphæna orbona* (*subsequa*) near Lyndhurst, Hants, on the 1st of August last. My brother and I were walking amongst some heather about a mile from Lyndhurst, on the south side of the road from that town to the Lyndhurst Road Railway Station, when the insect flew by and was captured by my brother. I am sorry to say, however, that the moth is no longer in my possession. I had taken it last Saturday week to the Natural History Museum, South Kensington, to compare with specimens there, in order to make sure of the species, and was careless enough, in returning from the Museum, to leave the box containing it (with other species) on the rack in the railway-carriage. I have made every enquiry through the railway authorities and at Scotland Yard, but up to to-day have heard nothing of the box.—HENRY A. HILL; 132, Haverstock Hill, London, N.W., September 25, 1889.

CATOCALA FRAXINI IN HANTS.—I captured at Porchester, by sugaring, on September 3rd, a specimen of *C. fraxini*, and also another on the following night. They are both in good condition.—M. J. STARES; Porchester, Fareham, Hants, September 9, 1889.

CATOCALA SPONSA AND C. FRAXINI AT WINCHELSEA. — I caught the above on the nights of Aug. 20th and 22nd respectively, at sugar, the former during, and the latter immediately after, a strong W.S.W. wind. I believe they are both new to the local list.—D. W. CARR; Holbrooke, Derby, September 3, 1889.

CIDARIA RETICULATA, LONG IN PUPA. — I have proved to my satisfaction that *C. reticulata* stays more than one season in the pupa state. I have bred it this year from rubbish I collected two years ago. I have always suspected this. I have also bred *Eupithecia venosata* this year from larvæ I took in the Isle of Man in June, 1887.—H. MURRAY; Lowbank Villa, Carnforth, September 14, 1889.

NOTES FROM THE NEW FOREST. — I went down to Lyndhurst on August 2nd last, but bad weather setting in, I returned immediately. On the 15th I started once more and put up at Lyndhurst Road. During the fortnight that I stayed in the Forest there was a good deal of rain off and on, but the weather improved considerably towards the latter part of my stay. It was evidently a bad season there for Lepidoptera, for very few were to be seen on the wing, and I collected in nearly every part of the Forest. Of the Diurni, *Pararge egeria* was very abundant in some of the woods, and *Gonepteryx rhamni* was also plentiful and in fine condition. Instead of the countless numbers of *Argynnis paphia* that I noticed in Boldre Wood last year, this time only a few tattered individuals were to be seen now and again. I took *Satyrus semele* in a number of different localities, and the specimens were very good. The only other butterflies that I saw were *Pieris brassicæ*, *P. rapæ*, *P. napi*, *Vanessa urticæ*, *V. io*, *P. megæra*, *Epinephle ianira*, and *E. tithonus*. Sugar was a complete failure, for after going out night after night and trying a great many different spots, my total "bag" only amounted to one *Thyatira batis*, one *Xylophasia monoglypha* (*polyodon*), one *Agrotis suffusa*, three *Amphipyra pyramidea* and two *Mania maura*, although on one occasion my brother, myself, and a friend got almost "bagged" ourselves by a troop of about eight or nine forest ponies, which, with piercing neighs, came full gallop at our light, and had it not been for the friendly protection afforded by the trunk of a large oak, behind which we jumped, after shutting off the lantern, I expect that it might have been our last "sugaring" expedition. I was not altogether surprised at this scarcity of insects, after the very rainy cold weather of July and the severe gales at the commencement of August. I met with two different collectors at Lyndhurst, and on questioning them I found that their experience agreed entirely with mine as to the bad season.—W. H. BLABER; Groombridge, Sussex, September 16, 1889.

FOREST OF DEAN.—The Forest of Dean, for various reasons, does not seem to be a favourite hunting-ground for collectors. The ground is hilly and uneven, and hard to work. The trees are mostly of young growth, and too close together, and are nearly all oak. The soil is poor, and vegetation is, for the most part, limited to a coarse kind of grass with a sprinkling of bracken. There are, however, many places, especially near the edge of the Forest, where the trees are of large growth, and there are many beech, firs, holly and ash, with a few sycamore and birch mingled with the oak. Some of the clearings also are covered with furze, heath,

wild thyme, brambles, and other flowers. These spots may easily be missed by anyone not familiar with the ground, but when worked steadily and persistently may be made to yield many good things. For the larva-hunter there is no lack of sport. Nearly every year, towards the end of May, whole districts, sometimes the entire Forest, instead of being clothed with bright green leaves, have a scorched brown appearance, nearly every leaf being devoured, some trees being even killed outright by the depredations of the innumerable larvæ. Few, however, of these myriads survive. Flocks of young starlings, rooks and jackdaws adjourn to the Forest from all the country round, and fatten on their tender bodies, searching both ground and trees, so that after these birds are gone scarcely a larva is to be found. Cuckoos also abound, and "horse-ants," as they are locally called, come in for their share, climbing the trees to look for their victims. Sometimes, however, the aggressor gets the worst of it, the larva, if caught by the tail-end, being enabled to turn and eject its protective fluid over the ant's head, causing it instantly to let go, and ultimately to die. The following are from a list of over 300 species taken in the Forest. This list, I have no doubt, is capable of being largely added to:—*Argynnis paphia*, in one small enclosure only, where the dog-violet grows. *A. adippe*, rare. *A. selene*, frequent. *Vanessa c-album*, common. *V. polychloros*, frequent. *V. cardui*, frequent. *Apatura iris*, rare. *Thecla w-album*, very local, but abundant where it occurs. *Colias edusa*, one specimen only. *Smerinthus tiliæ*, frequent. *Chærocampa porcellus*, rare. *Psilura monacha*, rare. *Pericallia syringaria*, rare. *Nyssia hispidaria*, frequent. *Amphidasys strataria*, common. *Emmelesia affinata* and *E. alchemillata*, both common. *Lobophora halterata*, frequent. *Bupalus piniaria*, frequent. *Melanthia hastata*, rare. *Stauropus fagi*, rare. *Notodonta trepidata*, frequent. *Asphalia ridens*, frequent. *Acronycta leporina*, rare. *Triphæna fimbria*, rare. *Taniocampa munda*, very common, in pupa-digging more than fifty per cent. were the pupæ of this moth. *Aplecta prasina*, frequent. *Amphipyra pyramidea*, common. *Phytometra viridaria*, frequent. *Hemerophila abruptaria*, rare. — N. T. SEARANCEKE; Mitcheldean, near Gloucester, August 23, 1889.

SUGAR UNPRODUCTIVE.—I can corroborate Mr. Hodges' note (Entom. 212) about the unproductiveness of sugar in June last. Both my brother and I "sugared" nightly for the first three weeks in that month, with most deplorable results; together we certainly did not take more than a dozen specimens. I do not agree with Mr. Hodges' hypothesis "owing to the cold." I think the better explanation is that it is owing to the superabundance of honeydew on the foliage, and I have come to the conclusion that very little good can be done until there has been sufficient rain to wash it off, as was the case last June.—C. E. STOTT; Lostock, Bolton-le-Moors, August 19, 1889.

PARASITES ON LEPIDOPTERA.—My experience shows these parasites (Entom. 237) to have been common during the season. On the evening of July 23rd, for example, I took a *Caradrina quadripunctata (cubicularis)* off a Chester gas-lamp. At first I took the moth to be a variety, as the upper wings,—upper wings only,—were mottled with red. This I discovered to be due to red parasites, similar in appearance to the ordinary cheese-mite. The insect, with parasites, is now in the Entomological Collection for the District, Grosvenor Museum, Chester. — J. ARKLE; 2, George Street, Chester.

PARASITES ON MOTH.—On June 26th I netted a specimen of *Noctua augur*, with the fore-wings almost covered with red parasites, giving the moth a very curious appearance. — W. E. BUTLER; Chatham Street, Reading, September 13, 1889.

BOMBUS TERRESTRIS IN LONDON.—I have observed this autumn a number of *Bombus terrestris*, revelling in the sunflowers in the Embankment Gardens, near Charing Cross. Where could they have come from? Do they breed in the gardens?—W. H. TUCK; 47, Cathcart Road, South Kensington, September, 1889.

ERRATUM.—On p. 234, 31st line in *Zeuzera pyrina*, read "sight" for "light."

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—September 4th 1889. — Capt. H. J. Elwes, F.L.S., Vice-President, in the chair. Prof. C. H. Fernald, of Amherst, Mass., U.S.A., and Mr. C. J. Fryer, of Emscote Road, Warwick, were elected Fellows; and Prof. C. V. Riley, of Washington, U.S.A., and Dr. A. S. Packard, of Providence, Rhode Island, U.S.A., were admitted into the Society. Mr. George T. Baker exhibited two remarkably dark specimens of *Acronycta ligustri* taken near Llangollen. Mr. P. B. Mason exhibited and remarked on a collection of Lepidoptera which he had recently made in Iceland. The following species, amongst others, were represented, viz.:—*Crymodes exulis*, *Tryphæna pronuba*, *Noctua conflua*, *Plusia gamma*, *Larentia cæsiata*, *Melanippe sociata*, *Coremia munitata*, *Phycis fusca*, and *Crambus pascuellus*. The Rev. Dr. Walker also exhibited a number of Lepidoptera, Diptera, and Hymenoptera, recently collected by himself in Iceland. The collection included the following, viz.:—*Crymodes exulis*, *Noctua conflua*, *Larentia cæsiata*, *Coremia munitata*, *Culex pipiens*, *Scatophaga stercoraria*, *Calliphora erythrocephala*, *Heliophilus grænlandica*, *Bombus terrestris*, &c. Mr. W. White exhibited, on behalf of Mr. G. C. Griffiths, a specimen of *Nephronia hippia*, Fab., var. *gæa*, Feld., which he believed to be hermaphrodite. He also exhibited, for comparison, a female of the same species. A discussion on hermaphroditism ensued, in which Mr. Distant, Capt. Elwes, Mr. M'Lachlan, and Mr. Baker took part. Dr. Sharp exhibited specimens of *Cychramus luteus* and *fungicola* Auct., and stated that they are the sexes of one species, *C. luteus* being the male, *C. fungicola* the female. In working through the Central American *Cychramini*, he had found that in some genera the males differed greatly from the females in size and sculpture; but this was not a constant character, for in some species, while certain males scarcely differed from the females in these respects, others were so different that they would scarcely be recognised as belonging to the same species. Mr. Edward A. Butler exhibited specimens of *Platymetopius undatus*, Deg., from Ewhurst, Surrey. He remarked that the species was recorded as having been once previously taken near Plymouth by the late Mr. John Scott. Mr. G. T. Baker read a paper entitled, "On the distribution of the Charlonia group of the genus *Anthocharis*." Mr. Baker stated that the species, six in number, of this small division of the genus *Anthocharis* formed a very natural and closely allied group, presenting many points of interest, both

in their relationship to each other and in their geographical distribution, which extended from the Canaries on the west to the valley of the Indus on the east. The author's theories as to the causes of the present distribution of the group, which were based on geological data, were discussed by Capt. Elwes, Mr. M'Lachlan, Mr. Distant, and Mr. Stainton. The Chairman read a paper entitled, "On the genus *Argynnis*," which gave rise to a discussion in which Mr. Distant, Mr. Jenner Weir, and Prof. Riley took part.—H. Goss, *Hon. Secretary*.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.
—August 22nd, 1889. J. T. Carrington, Vice-President, in the chair. Mr. Wellman exhibited a number of *Abraxas grossulariata*, showing considerable variation, and *Scoparia angustea*, from Folkestone. Mr. Skinner, a bleached example of *Epinephle ianira*, taken at Box Hill. Mr. Carrington, on behalf of Mr. Lewcock, some 300 specimens of Coleoptera taken during the season, being some of the larger aquatic species, a few Donaciæ, Malacoderma, Heteromera, &c., mainly from Chattenden, Epping, Woking, and Farnham.

September 12th, 1889.—T. R. Billups, President, in the chair. Mr. Jenner Weir exhibited desquamated upper wings of the male of *Argynnis paphia*, in order to show that the apparent thickening of the median nervules and sub-median nervure, in that sex of the species, was due to the dense covering of broad scales, bent over and concealing some very narrow, clavate, black scales or androconia; these appeared to be of a different substance to the ordinary scales of the wings, so that when, by the Waterhouse process, he had denuded the wings of the ordinary scales, the androconia remained intact, and were removed by the use of the camel's-hair brush, considerable friction being necessary. Mr. Weir remarked that he had been induced to bring this matter before the Society, because he found that some British entomologists appeared to think that, in the restricted genus *Argynnis*, there was a real dilatation of some of the median nervules, and occasionally of the sub-median nervure, but a reference to Mr. Scudder's work on the 'Butterflies of the Eastern United States and Canada,' and to the 'Exotische Schmetterlinge von Dr. Staudinger und Dr. Schatz,' would show that neither the American nor German entomologists named had fallen into such an error. Mr. Weir exhibited some specimens of *Vanessa urticæ* bred from larvæ taken at Lewes; these, although bred from one locality, showed great variation in the amount of yellow on the fore wings: in one instance that colour formed almost a band across the wings, and in one of the specimens the costa was unusually dark, and the red of the lower wings very much reduced in extent. Mr. Wellman, *Bryophila muralis*, *Lobophora polycommata*, and dark forms of *Gnophos obscuraria*, from Folkestone. Mr. Croker, *G. obscuraria* from the New Forest, and a variety of *Teniocampa gothica*, closely approaching var. *gothacina*, taken at West Wickham. Mr. Fenn mentioned that he had taken a similar variety at Lewisham. Mr. Auld, a long series of *Cidaria truncata*, bred from a female captured in the New Forest. Mr. Turner, a pink variety of *Hypsipetes sordidata*, also dark forms of *Boarmia gemmaria* from Ashdown Forest, and specimens of *Cabera rotundaria*. A discussion ensued as to whether this was a distinct species or only a variety of *C. pusaria*.—H. W. BARKER, *Hon. Sec.*



Believe me to be
Yours very truly
Fred Bond

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FREDERICK BOND: IN MEMORIAM.

FREDERICK BOND was born at Exmouth on the 22nd February, 1811, being the third son of William Bond, a Captain in His Majesty's 77th Foot, whose widow married a brother-officer of the same surname, Captain Benjamin Bond, of Mount Pleasant, Kingsbury, Middlesex. He was educated at Brighton, and was intended for the medical profession; but the dissecting-room was distasteful to him, and being blessed with a competency sufficient for his modest requirements, he was left free to indulge his propensity for sport and natural history, and became an adept alike with gun, rod, and net. He was also devotedly fond of flowers and ferns, and, particularly in his later years, would spend hours in attending to his garden and greenhouse. But his chief occupations were shooting, fishing, and collecting insects; and being endowed with great power of observation, he amassed a vast store of knowledge respecting the habits of our native birds and insects, principally of Lepidoptera. Primarily he was an ornithologist, and his collection of British birds and their eggs was remarkable. But his ornithological virtues will doubtless be chronicled elsewhere. It is of the entomologist that we have here to speak, and in his character of British Lepidopterist to take a last farewell of our departed friend.

At the age of fifteen, or thereabouts, Frederick Bond began to collect insects, and down to the time of his death he missed no opportunity of adding to his cabinet. He cared little or nothing for foreign insects, and his British collection was confined to the Order Lepidoptera. It is not too much to say that it is one of the best collections of the present day. It is simply splendid, and especially rich in curious varieties; whilst its interest is enhanced by the fact that so large a proportion of the whole were captured or bred by himself.

With the exception of two or three years' residence in Cambridge, about five and twenty years ago, Mr. Bond lived all his life in or near London,—at Kingsbury until 1855, afterwards in Cavendish Road, St. John's Wood, and Adelaide Road, Haverstock Hill; whilst the last sixteen or seventeen years of his life were spent at Staines. He was elected a member of the Entomological Society in 1841, and joined the Zoological Society in 1854. At the meetings of the former he was for many years a regular attendant and exhibitor, though latterly, owing to his retirement to Staines and his increasing deafness, the Society has missed his genial presence.

I am not aware that he ever travelled beyond the seas; but his shooting and collecting excursions were frequent, and extended to all parts of the Island. During his long career he captured so many rarities that it is impossible to enumerate the species. Conspicuous among them was the lost *Noctua subrosea*; and in his early days he both captured and bred the extinct *Lycæna dispar*. He used to tell how a Mr. Henderson transported larvæ of *L. dispar* from their native haunt in the fens to some water-docks which grew in a small pond in his garden at Milton, near Peterborough; and I believe it was at this spot that Mr. Bond last saw *L. dispar* on the wing.

It was one of his sayings that a naturalist ought to have three lives: seventy years to collect, seventy to study his collection, and seventy to impart his knowledge to others. For the last dozen years he gave his services as assistant editor (for Lepidoptera) of this magazine, and none will be more ready than the editor and his colleagues to acknowledge the value of the aid he rendered. But our friend had no literary proclivities; he was no great student of books, and he seldom took up his pen when he could avoid it. His published articles consist only of a few short notes, scattered over the various Natural History journals of the last sixty years; the earliest appearing in 'Loudon's Magazine' in 1830, and the last in 'The Zoologist' for June, 1889. The following list includes all his notes on entomological subjects that I have been able to discover:—

1. Note on the occurrence of rare British Insects. Zool. 1843, p. 125.
2. Note on the cure of "grease" in insects. Zool. 1843, p. 175.
3. Note on the occurrence of *Colias edusa* and *C. hyale* in Northamptonshire. Zool. 1844, p. 397.
4. Note on the capture of *Polyommatus arion*. Zool. 1845, p. 803.
5. Flowers attractive to Moths. Zool. 1846, p. 1341.
6. Occurrence of *Sphinx convolvuli* near Kingsbury, Middlesex. Zool. 1846, p. 1510.
7. Occurrence of the Locust at Kingsbury, Middlesex. Zool. 1846, p. 1518.
8. Occurrence of the Locust at Duxford and Fulbourne. Zool. 1846, p. 1521.

9. Capture of *Vanessa antiopa* near Kingsbury, Middlesex. Zool. 1847, p. 1791.
10. Capture of Lepidoptera near Yaxley in Huntingdonshire, from the 12th to the 20th of August. Zool. 1847, p. 1881.
11. Occurrence of the Locust near York. Zool. 1847, p. 1900.
12. Capture of *Buprestis mauritanica* in Plaistow Marshes. Zool. 1848, p. 1999.
13. Occurrence of the Locust in Cambridgeshire. Zool. 1848, p. 2000.
14. *Colias edusa* and *C. hyale*. Zool. 1849, p. 2612.
15. Captures of Lepidoptera at Hornsey, Wicken, and Burwell fens between June the 8th and July 1st, 1850. Zool. 1851, p. 3012.
16. Occurrence of *Vanessa antiopa* near London. Zool. 1852, p. 3715.
17. Occurrence of *Deilephila lineata*. Zool. 1860, p. 7107.
18. Occurrence of *Sesia spheciformis* in Sussex. Zool. 1860, p. 7249.
19. *Acidalia rubricata* at Brandon in Suffolk. Entom. ii. 70 (1864).
20. Capture of *Acidalia rubricata*, &c. Ent. Mo. Mag. i. 96 (1864).
21. Capture of *Agrophila sulphuralis*, with notice of its habits. Ent. Mo. Mag. i. 214.
22. *Rhyssa persuasoria*. Ent. Mo. Mag. i. 278.
23. A new locality for *Gelechia pinguinella*. Ent. Mo. Mag. ii. 136 (1865).
24. A new locality for *Endromis versicolor*. Ent. Mo. Mag. iv. 12 (1867).
25. *Lasiocampa quercus* versus *callunæ*. Ent. Mo. Mag. iv. 35.
26. Occurrence of a *Fumea* (*F. crassiorrella*, Bruand) new to Britain. Ent. Mo. Mag. iv. 113; Entom. iii. 368.
27. *Dianthæcia conspersa* as an Irish species. Entom. iv. 121 (1868).
28. *Deilephila galii* in Herefordshire. Entom. v. 168 (1870).
29. *Deilephila livornica* in Dorsetshire. Ent. Mo. Mag. vii. 40 (1870).
30. *Deilephila galii* in Herefordshire. Ent. Mo. Mag. vii. 86.
31. *Ephyra pendularia*, var. Entom. ix. 217 (1876).
32. Variety of *Saturnia carpini*. Entom. x. 1 (1877).
33. *Danaïs archippus* in Sussex. Entom. x. 73.
34. *Cidaria fulvata*, var. Entom. x. 120.
35. Note on *Polyommatus dispar*. Entom. xiii. 139 (1880).
36. *Zomaspilis marginaria*. Entom. xiii. 169.
37. Notes on the season. Entom. xiv. 184 (1881).

Add to this meagre list the fact that the entomological notes he has left (now in the possession of his godson, Mr. Thurnall), are scarcely in a form to be made available for public use; and we cannot but regret that so large a stock of entomological lore lies buried in the grave of Frederick Bond.

But though averse to writing, he delighted to recount his experiences, and the pleasure he took in giving information to others was a distinguishing trait in his character; to the close of his life, he was never too tired or too ill to show his treasures, to answer any number of questions, to name any quantity of species for a youngster, and generally to give the benefit of his practical knowledge to every one who sought his aid. On his favourite subjects he was brim-full of information; and I never knew a man with whom it was such a pleasure to have a chat about butterflies or moths. Take a few specimens to him,

"Now, Mr. Bond, what's that? where do you think it came from? and what does it feed upon?" Nothing more was required; he would pour out all he knew, take you to his cabinet and show you a perfect series or perhaps a finer variety of the same insect, then pass from species to species, tell you where and when he captured this or bred that, interspersing the whole with quaint anecdote and homely story,—his eyes twinkling, and his rugged features beaming all over with merriment,—until the visitor forgot the lapse of time and found himself late by an hour or two for his next appointment. Such at least was my own experience when I first went to see him at home. My earliest recollections of Mr. Bond go back for well-nigh forty years, to the time when the Entomological Society was located in Old Bond Street, and to the days when he was in the habit of visiting his old friend and connexion, Mr. F. Barlow, at Cambridge. But it must be about thirty years since I first saw his collections. In company with Alfred F. Sealy, I went to Cavendish Road; we were unexpected, but the Master was at home, and the result was that, between his cases of birds, his drawers of insects, and his fund of anecdote, a spring morning had turned to evening twilight before we had finished our gossip.

It was never my lot to have a day's collecting with Mr. Bond. But those who have worked with him in the field speak with one voice of the vigour and perseverance with which he pursued his object, and of his unflagging cheerfulness, even under the most depressing circumstances.

He was a collector,—of the old school, and of an insular type, if you will,—but a collector pure and simple, who was more at home in the field than in the library, who always kept his eyes open, and learnt from Nature herself many of her lessons that had escaped the observation of others. His liberality to his brother-collectors was unbounded; and the sound advice and encouragement he so freely gave, especially to beginners, has probably done more to advance the science of Entomology than if he had written a hundred books.

His simplicity of mind, his unselfishness, his constant cheerfulness, and his unvarying kindness, endeared Frederick Bond to all who knew him. Either as man or entomologist, where shall we find his like?

At the ripe age of seventy-eight, his peaceful and uneventful career has ended. He lived and died a bachelor, a widowed half-sister having ministered to his domestic comforts for the last thirty-eight years of his life. His death took place on the 10th August, 1889.

The accompanying photograph was taken in 1882, and fairly recalls his features. Already, however, a generation of entomologists has grown up, to whom he can scarcely have been

personally known. He has left no writings to perpetuate his name, and future ages will know him only through his eponyms, the British Noctuid, *Tapinostola Bondi*, and the Indian Longicorn, *Xynenon Bondi*. But by his surviving friends his memory will be cherished; and to those who knew him best, his long and happy life will be the sweetest retrospect.

J. W. DUNNING.

NOTE ON THE CLASSIFICATION OF CICADÆ.

By G. B. BUCKTON, F.R.S., &c.

As Entomological science progresses, the families of Rhynchota call for more attention in this country than has been hitherto bestowed upon them. Good workers, like Messrs. Douglas and Scott, in their 'Monograph on the Hemiptera-Heteroptera,' and Mr. James Edwards in his 'Synopsis of British Cicadinæ,' have published valuable matter relating to this order of insects. Still no illustrated work on the last-named subfamily exists, though the group offers considerable interest both in the varied forms and colours of the species, their life-histories, and, from a literary point of view, in the curious mythic notions connected with some species; which have been spun from the imaginations of not a few ancient classic poets.

To assist in the identification of the British species, generally recognized by the name of Cicadæ or Cicadidæ, I have a monograph in preparation, which will appear towards the commencement of the next year, giving coloured representations of all the British species,—upwards of two hundred,—which have come under my notice.

Zoological classification must primarily depend on the comparison of species with species, which involves a kind of uncertainty as to what characters shall be used to form a system that lays claim to be in any sense a natural one. Thus, much will depend on the opinion of the systematist, and the acumen he shows in fixing on those characters which are really specific.

Probably many will hesitate to accept the words of Fabricius as to generic names, "Optima nomina quæ omnino nil significant." Yet it will be admitted, that in forming the main heads of classification, the use of highly distinctive names may sometimes occasion inconsistency.

Latreille divided the Cicadæ or Cigalles into "les Chan-teuses" and "les Muettes," and quite lately, Mr. W. L. Distant has divided the Indian Cicadidæ he describes into two groups, which practically separates the singing from the silent genera. The insects comprised in the latter division must be numerous in

the temperate regions of the Himalayas; but to them he does not appear yet to have given a name.

The author of the present note invites a suggestion from students of the Hemiptera, for some suitable name to be given to the large number of Trimerous insects which do not stridulate, and which are neither Aphides nor Coccidæ, nor members of any of the families usually comprehended in the Hemiptera-Homoptera. Burmeister, Fieber, Sahlberg, Walker and Edwards, have all shown a connection between the extremes of Cicadetta and Typhlocyba, for these writers group the genera under the head Cicadina. An equivalent of "les Muettes" of Latreille, which will range with the Stridulantia of Burmeister, is wanted. Tentatively the term "Silentia" is offered, and for the whole family the term "Tettigiidæ," which will range with Aphididæ and Coccidæ.

Such a scheme would perhaps meet the views of those who consider that the possession of sounding organs with opercular scales in the males alone, is of sufficient import to sharply divide our only known British species from the Cercopidæ and Jassidæ, which have them not.

The annexed sketch, which is partially filled in, will show the position taken by the Cicadæ amongst other Rhynchota.

The word Cicadæ is here used as a plural to the English word Cicada.

Sketch-plan for the British Cicadæ.

	FAMILY	SUBFAM.	TRIBE	SUBTRIBE	GENUS
RHYNCHOTA HOMOPTERA.	Tettigiidæ	Stridulantia	Tibicinæ		Cicadetta
			Cicadinæ		Centrotus
			Membracinæ	Centrotidæ	Gargara
					Issus
		Silentia	Fulgorinæ	{ " "	Tettigometra
				{ Delphacidæ	Asiraca
			Cercopinæ		Liburnia
					Triecphora
					Aphrophora
				Ulopidae	Ulopa
				Ledridæ	Ledra
		Jassinæ		{ Bythoscopidæ	Pediopsis
				{ Acocephalidæ	Idiocerus
	Aphididæ			{ Typhlocybidæ	Athysanus
					Deltocephalus
	Coccidæ &c.				Eupteryx
					Zygina
			{ Aphidinae		
			{ Lachninae		
			{ Chermesinae		

LUPERINA TESTACEA VAR. *NICKERLII*, FREYER.

BY RICHARD SOUTH, F.E.S.

MR. BAXTER, of St. Anne's-on-the-Sea, Lancashire, has most kindly sent me a *Luperina* which he thought might be referable to *L. testacea* var. *gueneei*, Doubl. It was taken close to the water's edge on the 1st of August, and no example of typical *testacea* was seen by Mr. Baxter until the 10th of that month. In some respects the specimen agrees with Doubleday's description of *gueneei*, but it appears to be a form of *testacea* intermediate between *gueneei* and *nickerlii*.

The variety *nickerlii*, previously only recorded with certainty from Bohemia, though also reported to occur in the South of France, is usually regarded as a distinct species. Dr. Staudinger, however, considers it as probably a Darwinian species, and as it certainly is now linked up with *gueneei* by this Lancashire specimen, the logical conclusion would appear to be that if *gueneei* is a variety of *testacea*, *nickerlii* cannot be a distinct species.

By the courtesy of Mr. Leech, I have had an opportunity of examining three specimens of *nickerlii* from Bohemia, and the following description is taken from the most distinctly marked example:—

Forewing grey, tinged with ochreous, apex paler; orbicular and reniform stigmata broadly outlined in white; central area traversed by two whitish lines, the first is wavy with a sharp inward projection before reaching the inner margin, and bordered externally with black; the second edged inwardly with black commences as a white spot on the costa, unites with a larger white spot on the subcostal nerve, and then curves gently round the reniform, beneath which its course is inclined inwards to a black longitudinal bar connecting it with first line, from whence it proceeds vertically to the inner margin, emitting a short outward projection on the submedian nervure; between the base and first line is a short black bar just above inner margin; the submarginal line is pale, indented, and edged internally with dusky; two white spots on costa between second central and submarginal lines and one towards base; a series of small black lunules on outer margin. Fringes grey, spotted with paler at the extremities of the nervules. Secondaries silky white, with the faintest possible trace of a dark line before the fringes. Expanse 1 inch 4 lines.

In one of the other specimens referred to, the submarginal line is indicated by the dark internal shading only, whilst in the third the longitudinal bar is not present, and the submarginal line is followed by a darker band, as is often seen in *testacea*.

The ground colour of the Lancashire specimen is pale grey; the whitish transverse lines do not show clearly, but the black edging is very distinct, as also are the white spots on costa. The central lines approximate above the inner margin, but the longitudinal connecting bar is only faintly outlined; and there is a black dash between the lines on the inner margin. Fringes pure white. I may add that another specimen, received from Mr. Baxter, is in most respects of the ordinary *testacea* form, but has the central line connected by a black bar along inner margin, and there is no trace of the usual longitudinal discal bar.

15th October, 1889.

INVESTIGATION OF VARIATION.

By J. W. TUTT, F.E.S.

MR. CARRINGTON has hit at the root of the difficulty of forming a "Variation Investigation Society" in the one word,— "funds." Given sufficient "funds," anything might be done.

I think that almost all entomologists are agreed on the value of the study of Variation. It is the one purely scientific view of our subject that all entomologists can work at, with all due respect to those who would teach us that every entomologist ought to be the happy possessor of a chemical and a physiological laboratory, and that the biological view is the "be-all" and "end-all" of our subject. The rapid strides which individual work has brought about in our ideas of variation are beyond question, and there are very few lepidopterists (at least), who are not interested in this phase of the subject.

Mr. Carrington asks two pertinent questions, the first of which appears to depend on the second. Are there a sufficient number of students to support such an association? Of students in the strict sense I would answer,—No. Of those interested, and thus indirectly students, I would most decidedly answer,—Yes. But the latter must be subdivided into two distinct sections, *viz.*, those who know that when a scientific work has to be carried out, it costs something, and, secondly, those who do not appear to have grasped this principle. I would have put it differently, and suggested that the second class must know that there is a cost, but that they do not care to pay, although they do not mind being the recipients of that knowledge which others have dearly bought; but I think "Evil is wrought from want of thought," and not from want of sympathy. Entomologists have never supported their literary men. Our best entomological works have nearly all been brought out at a positive loss. Until the general entomologist recognises the fact that he ought to subscribe to a scientific work which is really wanted, nothing

worthy of the name of pure science can be done. Assuming what Mr. Carrington knows regarding the matter, I am not surprised at his doubts. The failure to get sufficient subscribers for a 'General Index to the Entomologist,' which is most urgently needed, is a proof that the individual does not see that he ought to help, indirectly, those who make use of a work of this kind and give the public the benefit of their work. If all who were *indirectly* interested in this subject had subscribed, every reader of our entomological journals would have sent in his name, instead of finding an excuse not to do so.

To return to the subject. I have not the remotest doubt that if all those who are interested in "Variation" would *subscribe*, and subscribe regularly, something might be done; but at present I am inclined to doubt whether many of the much-interested parties would "pay for their whistle." I would propose that if anyone would subscribe towards such an association, they should send in their names to Mr. Carrington. It is of no use for a few to do so,—everyone should do so, and a comparatively small subscription would produce a large result from a large number of members. Would 500 readers of the 'Entomologist' subscribe 2s. 6d. per year, or 250 subscribe 5s.? If so, a Council might at once be formed and the work taken in hand, and I have but very little doubt a satisfactory volume on the subject might be annually sent to subscribers, for their money.

ENTOMOLOGY OF ICELAND: NOTES UPON A VISIT IN 1889.

BY THE REV. F. A. WALKER, D.D., F.L.S., &c.

(Continued from p. 249.)

SIGLUFJORDUR, August 3rd (lat. 66° 9' N., long. 18° 83' W.). Siglufjordur, like Saudakrok, is situate on the beach, but is a far smaller place, apparently only consisting of from fifteen to twenty houses, and with far steeper hills in the background. There are a few cottages also at the opposite side of this branch of the fjord, and at the end of the said branch, at no great distance, the surrounding hills are permeated by watercourses descending from the ridges of snow near their summits and likewise fissured by ravines. It is more northerly than any place that we stopped at in the whole course of our voyage, and is said to be the most snowy bay in the country. Steam-whistle sounded as a signal that the people may now bring their merchandise on board. I took the opportunity of going ashore during the comparatively short time the steamer stopped here. Noticed one or two *Crambi*, caught one *Phrygania* and three *Calliphora*. These Diptera, along with *Sarcophaga mortuorum* were settled on a mass of

whale-blubber on the greensward. Two paths over the hills here lead respectively to Akureyri by different routes, in circuitous crooks and turns, the course of one of the said two paths going as far round as Skagafjord.

Akureyri (lat. $65^{\circ} 40'$ N., long. $18^{\circ} 4'$ W.). August 3rd. Akureyri, termed Ofjord in Danish, is situate more than thirty miles from the entrance of the spacious Eyjafjordur, far to the south, and nearly at its innermost extremity, and beyond these thirty miles of sea thirty miles of valley succeed, and then fifteen miles of desert. We enter the fjord about 1 p.m. Its western cliffs, near to which we are coasting, are for a while barren, indented by perpendicular fissures, and descending sheer into the sea, and down lower receding behind a dip of the land or a sloping valley of greensward, which is permeated by a water-course that trickles down. Akureyri, as seen from the water, appears to consist of two distinct hamlets; it is, however, possible that further inland other houses, unseen from the steamer, may form a connecting link. A terrible odour reaches us as we stand on deck, from the shark-oil factory, notwithstanding that it is situate a considerable distance from where our steamer is anchored. More vegetables, and potatoes in particular, as far as I can judge, are grown on the adjacent slopes here than in any other place that I have yet visited in Iceland. Pouring rain set in before we left the steamer and continued all the time we were on shore and lasted through the evening, while a dense mist enveloped the surrounding hills from our view, so that the only capture I effected was that of one *Phrygania*, and Mr. Jomhurs-son's little boy gave me a *Noctua* when I called at his house.

August 4th. There was more rain early this morning. By the time I went on shore, however, it had almost stopped, and I walked up to the top of the moor, accompanied by three of Mr. Jomhurs-son's children. *Creophilus maxillosus*, Carabidæ, and other Coleoptera, under stones; three or four Geometridæ seen. *Calliphora* abundant on the windows of the church, which is a very neat edifice, with galleries on either side and at the west end, and a picture of the Crucifixion over the communion-table. Large numbers of *Calliphora* also lying dead on the window-sills and the floor. The cemetery or churchyard is situate at the top of the moor, which is covered with the seed-vessels of *Dryas octopetala*. *Viola tricolor*, a flower I had not seen before in Iceland, is abundant on the slopes here, and also along the coast-road to Oddeyri, distant perhaps one English mile, and where the shark-oil factory is situate, a short distance from the other part of the parish of Akureyri, whence I took boat for the steamer, which had moved in the interval for a short space to that end of the bay. The above-mentioned coast-road is closely hemmed in between the waves on one side and a grassy slope on the other, and almost covered in one or two places by the water.

Vopnafjörd (lat. $65^{\circ} 42' N.$, long. $14^{\circ} 50' W.$). August 6th. We passed Langanes, the N.E. point of Iceland, shortly before breakfast this morning. The east coast here consists of a low rocky cliff, almost as uniform as a wall for a considerable distance in point of elevation, and trends rapidly to the southward after passing the aforesaid headland, so that we are now steaming along at a distance from the shore. The adjacent hills in the rear are grassy slopes, far lower on the northern than on the southern side, where the heights are terminated by rocky crags, on which cloud-wreaths are resting, and some patches of snow still remain.

Seydisfjörd (lat. $68^{\circ} 17' N.$, long. $13^{\circ} 58' W.$). August 7th. Seydisfjörd is a marvel of natural beauty. I went ashore shortly after 6 a.m. An amphitheatre of hills (and this is a highly appropriate term, for there are successive rocky terraces between the grassy slopes), surrounds the calm blue waters of the fjord, which closely resembles a placid azure lake in the bosom of the mountains. On the adjacent sunlit slopes both cattle and ponies are grazing. The whole place reminds me of what I have experienced in Switzerland, plus the disagreeable adjunct to every Icelandic fjord,—the bones and insides of fish steam everywhere,—not that this is so great and noticeable a disfigurement here as in several of the fjords that we have previously visited. Several slender waterfalls leap down the ravine, as though their threads of silver were all eager to reach the sunny verdant grass and glancing water below, and to escape from their native cradles, the long extinct craters on the summit of the hills, with their sides lined with patches and beds of snow. These colossal basins of ebony, with rims of white which the sun only touches sufficiently to make their gloom and desolation evident, seem to frown on the fair pastoral scene beneath, and to say, "Make the most of your three months' summer, before the mountains are once more concealed beneath a snowy mantle, and the fjord enclosed and shut up with chains of ice beneath the winter's gloom." *Calliphora* settled on two heads of catfish rotting in the sun; *Sarcophaga mortuorum* and Carabi, three Phrygians, one Geometra, two *Calliphora* caught; Crambi also noticed. Flowers: *Eriophorus campanula*, *Parnassia palustris*, two species of gentian.

Eskefjörd (lat. $65^{\circ} 5' N.$, long. $14^{\circ} 1' W.$). August 7th. The coast scenery near the mouth of Seydisfjörd, and also when we reach the open sea once more, crag and cliff and watercourse and crater, with deep indentations and winding valleys, continue very bold and fine. I obtained here *Sarcophaga mortuorum* and *Calliphora*, two of Geometra, two of Coleoptera, *Bombus terrestris*, white variety of gentian, yellow-flowering *Andromeda*, on the neighbouring slopes close by the waterfall.


(To be concluded.)

CONTRIBUTIONS TOWARDS A LIST OF THE VARIETIES OF NOCTUÆ OCCURRING IN THE BRITISH ISLANDS.

BY J. W. TUTT, F.E.S.



(Continued from p. 255.)


Apamea, Och., *pabulatricula*, Brahm, (*connexa*, Bork.).


THE type of this species is described by Brahm, 'Insektenkalender für Sammler und Ökonomen,' as:—"Grey *Noctua*, with orange-coloured crests." "Head and palpi grey; antennæ ash-coloured; eyes black-brown; crest grey, and has in front a faint brown transverse line, on each side a black brown streak, in the middle an erect orange-coloured crest; body grey, with a few ash-coloured ridges (comb-shaped) on the back. Fore wings grey, with a short brownish black line at the base of the wing. The orbicular and reniform stand in a light brown ground; before and beyond the stigmata is an undulating transverse line, which come so near together that they almost join and form the apex of an almost right-angled triangle, but instead of really joining they separate suddenly and turn back arch-like; the space to the inner margin filled out with blackish brown, crossed by a pale grey longitudinal line, which also passes through both transverse lines; on the inner margin stand a few pale brownish tooth-shaped markings turned towards the inside, and close to the edge a row of blackish brown triangular spots. Hind wings ashy grey." This description agrees almost precisely with the specimens captured in Yorkshire, and sent out by Messrs. Harrison and Young in considerable numbers; but Mr. Young writes:—"In fresh specimens the crest is rosy. The hind wings, too, are dark smoke colour, nearly black, but both the rosy crest and dark hind wings soon fade" (*in litt.*). There appears to be no variation worth speaking of; occasionally the shading on the costa is stronger, and hence makes the central area (enclosing the orbicular) more band-like; the width of the black -mark varies, and thus causes a difference in the width of this central band in its lower part; the pale line (really on the nervure), mentioned above as crossing the lower part of the band, is often indistinct; and the row of black triangular spots (really the teeth of the wavy subterminal line) are very poorly developed in British specimens. Hübner figures this species under the name of *elota*, with the central band and base of wings ochreous. Our specimens possess the slightest possible ochreous tinge in the centre of the banded area, but I have never seen any real characteristic development in this direction.


Var. *elota*, Hb.—Hübner, as mentioned above, figures in his 'Schmetterlinge,' &c., a form of this species with the markings much as in the figure of Newman's 'British Moths,' but with the central and basal areas of the anterior wings ochreous, and the costal and outer margins white.

Apamea, Och., *unanimis*, Hb.

This is an almost constant dimorphic species, one of the forms resembling somewhat the reddish variety, *rufescens*, of *gemina*, the other having the same ground colour, but having the peculiar claviform -like development seen in the var. *intermedia* of *gemina*; but the smaller size of this species, the well-developed, white-outlined reniform, narrower wings, and other minor characters serve at once to distinguish it; the dark transverse shade from the costa to the inner margin, extending between the stigmata, and so noticeable in some other genera, is very distinct in some specimens. Why Newman wrote that this species was larger than *gemina* ('British Moths,' p. 305), I cannot understand, as his description would not lead one to suppose that he was in doubt about the species. I have one very dark specimen labelled "Shoeburyness," and two others from Cambridge, with the central area inclining to a banded character (as in *pabulatricula*). There is a certain amount of sexual variation, the females being, as a rule, somewhat smaller and darker than the males. Guenée says of this species, "It varies rarely, and is, in this respect, very different to its congeners" ('Noctuelles,' vol. v., p. 209). Hübner's figure 556 (which is a very poor one) represents the type, and is of a dull brownish colour, with typical transverse markings. The figure represents a small female. It has "the anterior wings dull brown, with an abbreviated, followed by a complete basal line; the orbicular small and faintly outlined; reniform outlined in white; a pale angulated line directly beyond reniform; another pale line parallel to hind margin; extreme hind margin slaty grey. Hind wings dark grey, base paler, lunule darker." Freyer, in his 'Neuere Beitræge,' &c., vol. iv., pl. 371, figures both sexes of this species. His fig. 1 represents a "male, of a pale greyish brown ground colour, quite grey at base, with a short dark basal streak under the base of the median nervure, a fine double black basal transverse line, followed by a distinct orbicular and large reniform, both outlined in pale; the claviform is distinct and dark brown; a double line runs from base of reniform to inner margin; a transverse row of small white dots, followed by a wavy line, near hind margin; median area mottled with brown, outer area very dark grey. Hind wings pale grey, with a distinct lunule and darker hind margin." His fig. 2 is a female, "marked like fig. 1, but a little darker in ground colour. Hind wings darker grey." Haworth's *secalina*, var. β ('Lepidoptera Britannica,' p. 210), would appear to be the darker form of this species, his α representing the type, his β representing the form with the -like mark under the stigmata. We have, therefore, only to deal with two forms:—

1. Without an -like mark and without a partially-developed central band, = *unanimis*.

2. With an -like mark and darker central area, = var. *secalina*, Haw.

Var. *secalina*, Haw.—Ground colour of anterior wings dark umber-brown, with the transverse lines as in the type. The claviform developed into an -like mark, which reaches from the transverse line before, almost, or quite, to that beyond the stigmata; the central area between these transverse lines, and above and below this dark mark, darker than the ground colour, forming an incomplete band from the costa to the inner margin. Hind wings grey-brown (as in type), with a distinct discoidal spot. The description of Haworth's *secalina*, var. β , is as follows:—"Alis anticis lineola longa nigra in medio fasciæ ut in sequente, stigmatæ antico oblongo magis antrorsum inclinante; posticis fuscis, ciliis rufo-cinereis" ('Lepidoptera Britannica' pp. 210, 211).

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

DORITIS APOLLO AT DOVER.—During our recent visit to Dover one of my sons was collecting along the edge of the cliff, some distance beyond the Convict Prison, when he was startled by the sudden appearance of one of these fine insects. It flew from the bank (which hereabouts closely abuts on the path) across the path to the edge of the cliff, where it hovered for several seconds, and then slowly sailed downwards out of sight. Owing to the precarious nature of the ground my son was unable to take a step forward to secure it (which otherwise he could easily have done), but he had a splendid view of the insect. On his return he informed me of the occurrence, minutely describing the specimen, mentioning its colour, the rounded wings, and red ocelli. Naturally he waited long in the hope that it might reappear, but it was not to be: and we visited the spot afterwards several times, but without avail. Whence the insect came, and how it arrived there, I of course cannot say; I merely record its occurrence. The date was the 28th of August last. I greatly regretted having that morning gone in another direction; had we been together, perchance we might have secured it.—E. SABINE; The Villas, Erith, October, 1889.

COLIAS EDUSA IN 1889.—In addition to the records of last month we have received the following:—

Kent.—I may mention that I saw a male taken at Folkestone, and know of many others that were captured there by visitors during August. I also saw a fine specimen of the var. *helice* that had been taken there by Mr. Austen of that town.—J. R. WELLMAN; 8, Medora Road, Brixton Hill, Oct. 4, 1889.—I am able to add that my brother and I saw several specimens of this species in clover and lucerne fields near Broadstairs, Kent, in August last. We captured two good males, but did not take any females.—HENRY A. HILL; 132, Haverstock Hill, London, N.W., Oct. 3, 1889.

Cambridgeshire.—On the 31st August, whilst out hawking near Great Chesterford, in Cambridgeshire, I saw eight *Colias edusa*, seven on a piece of waste ground, and one in a stubble-field near some lucerne. As I had not my net I was only able to take one.—HAROLD MANN; Houghton, 9, The Drive, Brighton, Oct. 4, 1889.

Cheshire.—A single specimen was taken by a boy near the city last August, and I have several records from Shotwick and neighbourhood.—R. NEWSTEAD; Chester.

Aberdeen.—I may mention the capture of a fine specimen of *Colias edusa* by myself on Sept. 14th, 1889, in a garden at Denmore, near Aberdeen. I never heard of it so far north before.—W. CATTO; Cote Town, Bridge of Don, Aberdeen, N.B.

VARIATION IN *VANESSA ANTIOPA*.—In his paper on the "Aberrations in the Genus *Vanessa*," in the September number of the 'Entomologist,' Mr. South describes several varieties of *Vanessa antiopa*. Another form of this species occurs here, in which the rich brown of the upper surface of the wings is replaced with dull smoky black; the usual blue spots are faintly represented on the primaries, and a few blue scales only on the secondaries; the yellow border, of normal width, is much obscured with smoky black, especially on the primaries; under surface not strikingly dissimilar from the normal form, except that the border is darker. Maynard's statement that the form *hygiæa* occurs in about the proportion of one *hygiæa* to five hundred of the normal form does not hold good here. The number of blue spots on the primaries sometimes varies. I once raised a whole brood of this species, some of which had but a single blue spot on the primaries, others lacked but one; and the remainder possessed a varying number between these extremes. Cases like this, where a whole brood of some species shows considerable variation from the normal form, present a very favourable opportunity to study the causes of variation in insects. Such instances are by no means rare; two such are mentioned in Mr. South's article, where broods of *Vanessa io* all emerged as varieties. If this were due to inheritance, a portion only of the brood would vary, and the cause is certainly to be looked for in some other direction. Where a large number of insects are confined in the same breeding-cage they are exposed to very much the same external conditions, and it is not remarkable that when one varies, all, or nearly all, will vary. When only one, or a very few, vary, and when all were exposed to the same conditions (light, heat, moisture, food, &c.), I think we will have to fall back on "spontaneous" variation or reversion.—FRANK M. JONES; Wilmington, Delaware, U.S.A., Sept. 23, 1889.

EPINEPHELE IANIRA, VAR. — At the meeting of the North Kent Entomological Society, on Sept. 12th, Messrs. Allbuary and E. Knight exhibited a beautiful var. of *E. ianira*, which they captured on the south-east coast in August. The body, legs, and antennæ are white, and the wings are creamy white, with a pink tinge in the centre. Unfortunately two of the wings are slightly torn; otherwise the insect is in splendid condition.—H. J. WEBB; 3, Gunning Street, Plumstead.

POLYOMMATUS PHLÆAS VAR. *SCHMIDTII*.—While at Folkestone in August I was pleased to find that my friend Mr. Giles's (of that town) younger son Frank had been so fortunate as to take, at the foot of one of the hills, a very fresh and perfect specimen of the silver variety of *Polyommatus phlæas*, and on my return home I saw another of the same variety, taken, I believe, somewhere in the neighbourhood of Croydon by a Master Long, of Streatham, but this was unfortunately not in such good condition as the one seen at Folkestone.—J. R. WELLMAN; 8, Medora Road, Brixton Hill, S.W., Oct. 4, 1889.

RHOPALOCERA IN MONMOUTHSHIRE.—On the 10th of August last I took two splendid specimens of *Vanessa c-album* at Tintern, in a clearing in a wood on the way from the village to the Devil's Pulpit. The place is just opposite the Abbey. I also took about twenty specimens of *Pararge egeria*, which was extremely plentiful. All of them were in very good condition. On August 19th I returned to Tintern for a day, having been to Cardiff, Swansea, and other places in South Wales in the meantime, and, visiting the same wood, I took another beautiful specimen of *V. c-album*. I also saw another very rubbed one. *P. egeria* was more plentiful than before, but there were very few good specimens to be got. *Argynnis paphia* was also plentiful on the blackberry-bushes, but it had evidently been out some time, as none of the specimens I captured were worth their carriage to the hotel. In the same place I also took *Epinephele hyperanthes*, *Pararge megæra* (extremely plentiful on one bank), *Lycæna icarus*, *Plusia gamma*, and a few other day-flying moths, besides all the commoner butterflies. *Gonepteryx rhamni* was fairly plentiful, also at Chepstowe. On August 20th I returned to Hertford. On August 22nd, as I was out hunting, I saw a single specimen of *Colias edusa*, but was unable to take it, as it was flying very fast and up a sharp hill. Sugaring has been of very little use here during August or the first half of September, the only insect I have taken at all worth having being *Catocala nupta*.—S. P. ANDREWS; 25, Castle Street, Hertford, Herts.

SPHINX CONVULVULI.—The following additional records of the capture this season of this species have been received:—

Devon.—This hawk-moth appears to be common this year. In 1887 seven were captured in one garden, and one pitched on some flowers which I held in my hand in broad daylight. In 1888 I captured several in my garden, and saw many more; and this year I have never failed to see one when watching for them, but although the wild bindweed is found almost everywhere in the hedges, I have never been able to discover traces of the caterpillar of this moth.—MARCUS L. BRIDGER, R.N.; Walton Leigh, Salcombe, S. Devon.

Leicester.—I took a specimen of *S. convolvuli* at rest on a gravestone in Leicester Cemetery on the 13th of September last.—C. B. HEADLEY; 2, Stoneygate Road, Leicester.

Hants.—Two specimens were taken at petunia flowers in the Isle of Wight on Sept. 11th and 12th.

Derbyshire.—In August last a *Sphinx convolvuli* was found asleep in a conservatory here. —R. C. BINDLEY; Mickleover Vicarage, near Derby, Oct. 16, 1889.

DEILEPHILA GALII, PARASITES ON.—The larvæ of this insect was so abundant last year that doubtless a goodly number of your readers have reared the perfect insect, or been disappointed by breeding parasites. It would, I think, be of interest to learn what hymenopterous and dipterous parasites have been bred from these pupæ. At present I only know two species, Ichneumonidæ, bred from them. The Rev. R. Peek, of Sweffling, near Saxmundham, had fourteen pupæ from Aldborough, two of which were ichneumonated. From one he bred a specimen of *Tragus lictorius*, a very large and handsome species; from the other two *Amblyteles proteus*, Christ. These are both well-known parasites on the Sphingidæ, but I am not aware that *D. galii* has been recorded as one of their hosts, at least in this

country. Both these species are figured in Wood's 'Insects at Home,' the former under the name of *Tragus atropos*, the latter as *Ichneumon proteus*. —(Rev.) E. N. BLOOMFIELD; Guestling Rectory, Hastings, Oct. 10, 1889.

CHÆROCAMPA CELERIO AT HARTLEPOOL.—On the 1st October I had brought to me a very good specimen of the above insect. It was taken on the framework of a greenhouse by a little boy. It is only very slightly rubbed at the tips of the fore wings. —A. WOODS; Alderson Street, West Hartlepool, Oct. 17, 1889.

DICRANURA VINULA. — Apropos Mr. Styles' note (Entom. 260), the following data of two broods, extracted from last year's diary, may be of some interest:—First brood: Ova laid, May 25th; hatched, June 12th; pupated, August 2nd. Second brood: Ova laid, June 28th; hatched, July 15th; pupated, Sept. 25th. The ova of the first brood were obtained from a female taken *in copulâ* on Blackpool sand-hills, and from this batch we bred a very nice variety, the zigzag markings on the fore wings being replaced by two irregular lines. We had a rather curious experience with the second brood. The female was bred from a larva of the previous year, and to obtain a male we "assembled." Although laying her full quota of eggs, only about a dozen hatched, the remainder proving abortive.—C. E. STOTT; Lostock, Bolton-le-Moors, Oct. 7, 1889.

STILBIA ANOMALA IN WALES.—While mothing at Barmouth, near Dolgelly, in N. Wales, last August, I took two specimens of *S. anomala*; I also caught a specimen when there two years ago. I have not seen that place mentioned before as a locality for *S. anomala*. —C. S. HOLDSWORTH; 32, Croxted Road, West Dulwich, London, Oct. 6, 1889.

LAPHYGMA EXIGUA IN HAMPSHIRE.—Whilst looking at some insects the other day belonging to my friend Mr. Druitt I observed two specimens of the above species, and in order to make sure of their identity I have shown them to Mr. Richard South and others, who at once identified them as *Laphygma exigua*: one is in beautiful condition, the other not quite so good. Both specimens were taken by Mr. Druitt at Christchurch, whilst sugaring in September, 1888.—J. M. ADYE; Oct. 12, 1889.

VIOLET COLOUR IN *HELIOPHOBUS HISPIDA*. — Neither Newman nor Stainton say anything of a violet tinge in the coloration of this species, and very recently it has been stated that the specimens from Torquay and Portland do not "show the typical violet coloration." As I have never to my knowledge seen Torquay examples of *hispida*, I must accept the dictum of those who have, but last year I was shown six specimens from Portland, and my impression was and is that they exhibited a violet shade, especially in the stigmata and pale central transverse markings. This year Mr. Nelson M. Richardson, of Weymouth, has been good enough to send me a nice series of Portland specimens, and in these I notice a decided tinge of violet, not so strong perhaps as shown in Hübner's figure, but nevertheless as well developed as in most of the continental specimens I have seen. Mr. Richardson has also very kindly sent me for examination two extreme aberrations illustrative of the opposite limits in the range of variation of this species in the Portland locality, and these specimens, together with his most instructive remarks thereon, throw light on that which had previously

mystified me greatly. I now apprehend that, although decidedly a variable insect, *H. hispida* is not the protean species I had been led to suppose it was, and that beyond a greater or lesser amount of pigment in coloration, and more or less intense markings, there is really no exceptional departure from typical lines, such, for instance, as possessing "a bifurcate transverse median line, extending under orbicular to the reniform and the central part of the basal nervures."—RICHARD SOUTH; 12, Abbey Gardens, St. John's Wood, N.W.

CATOCALA FRAXINI IN KENT.—Having noticed the announcement of one or two captures of *Catocala fraxini* this year, I think it may interest you to know that when sugaring in a garden on the banks of the Medway below Rochester on Sept. 1st and 2nd last year, one specimen came to sugar on each night, I should think probably the same insect on each occasion. Being a novice in Entomology, both nights being very dark, not having a box large enough, its shyness, and my natural excitement, it may be excusable that under the circumstances I was not clever enough to capture it. I searched the garden and walls early the following morning, but without success, and have not ceased to bewail my fate, as I do not suppose I shall have such a chance again. When I heard, during the second week of last month, that *C. fraxini* had been taken in other parts, I went to the Medway and sugared energetically, but not a moth of any kind, rare or common, came to the call.—MARK H. WINKLEY; 9, Glen Eldon Road, Coventry Park, Streatham, S.W., Oct. 1, 1889.

ENNOMOS AUTUMNARIA.—On Monday, 9th September last, whilst spending a day at Hayling Island, I took a female specimen of *Ennomos autumnaria* at rest on the gate-post of a private house within a short distance of the sea-shore. By a curious coincidence, on the following Monday morning, 16th September, I took a male specimen of the same species on a lamp-post in Portsmouth town. The insects, which I have carefully compared with the two specimens in the Doubleday collection, are of $2\frac{1}{2}$ and $1\frac{3}{4}$ inches expanse respectively.—C. B. SMITH; 58 Rectory Road, Stoke Newington, N., Oct. 10, 1889.

EMMELESIA UNIFASCIATA, DEFERRED EMERGENCE.—I was not aware that this species remained in the pupa-state for more than one year, but have found that such is the fact. In 1887 my kind friend Mr. Sheldon, of Addiscombe, handed me some pupæ, which all but about six emerged as imagines in 1888; but from these, six moths put in an appearance this year. Again, last season (1888) I obtained larvæ of *E. unifasciata*, which in due course changed into pupæ, and the perfect insects emerged in July last, with the exception of six or eight, which are still healthy-looking pupæ, and will, I suppose, remain over until next season.—J. R. WELLMAN; 8, Medora Road, Brixton Hill, S.W., Oct. 4, 1889.

LEPIDOPTERA OF TWO DORSET CHALK-HILLS.—Almost everyone is acquainted with the fact that Dorsetshire is rich in British and Roman remains, notably the splendid Roman encampments, every hill almost being capped with extensive earthworks; the entrenchments on some being to the present day more than thirty feet deep. Upwards of twenty such hill-fortresses are known upon the north and south downs of the county, and in the vicinity of most are usually to be seen the remains of

barrows, and other places of ancient burial; I say remains, because nearly all have been despoiled of their contents, such as urns, bronze-daggers, sword-blades, &c. It is upon the sites of these ancient earthworks that many Lepidoptera may be found. Upon two of the northern hills, *viz.*, Hambledon and Hod, which are divided from nearly all the others by the River Stour, I have worked for Lepidoptera, especially Diurni, for the last seven years, with a fair amount of success. I may, however, mention that I have never met with a collector there, so imagine the district to be devoid of entomologists. The hills are easily reached from all parts of the county, booking by the Somerset and Dorset Railway to Shillingstone, and from thence, a pleasant walk of about two miles, to the top of Hambledon, which is about 800 feet high. Then one makes way towards the southern slopes, when operations can be commenced by netting the following:—*Melanargia galathea*, *Pararge egeria*, *Epinephele hyperanthes*, and var. *arete* (common), *Hesperia sylvanus*, *H. thaumas*, *H. comma*, the latter very abundantly; I have never seen it in such profusion anywhere else. Amongst hazels, &c., *Thecla rubi*, occasionally *Argynnis paphia*, *A. euphrosyne*, *A. selene*. Amongst the moths I have taken several *Toxocampa pastinum* and *Zygæna trifolii*; also some common species which I will mention shortly, but I do not think there is much to be done upon this hill. No doubt the best locality is upon Hod Hill, which is separated from Hambledon by a narrow valley, and is in full view of the collecting-ground just described. Ascend until the second entrenchment is reached, forming a miniature valley. It is along here the species are most numerous, and where I have taken the following:—*Colias edusa* (several), *Gonepteryx rhamni*, *Satyrus semele* (abundant), *Vanessa io*, *V. atalanta*, *V. urticæ*, *V. cardui* and larvæ, *Syrichthus malvæ*, *Nisoniodes tages*, *Lycæna icarus*, *L. minima* (only four), *L. corydon*, *L. bellargus* (two last very abundantly), *Zygæna filipendulæ*, *Ino statices*, *Botys flavalis*, *Pyrausta purpuralis*, *Ennychia nigrata* and an allied species with bars straight; *Chærocampa porcellus* and *Nemeophila plantaginis* are very common, males flying freely during sunshine, and often to their cost, as I have watched the swifts (*Cypselus apus*) feeding upon them, even two or three sometimes being caught at a sweep by one of these birds. I have not observed them treat butterflies in a similar manner. Species found upon both hills are:—*Pieris napi*, *P. rapæ*, *P. brassicæ*, *Euchloë cardamines*, *Cænonympha pamphilus*, *Polyommatus phlæas*, *Pararge megæra*, *Epinephele ianira*, *E. tithonus*, *Argynnis aglaia*, &c. By the above notes it will be seen that several species found upon Hod do not occur upon Hambledon, and *vice versâ*. The list is small, but no doubt it could be enlarged; still thirty-three out of our limited number of butterflies are to be found on these two hills. In conclusion I may mention that I visited Hod in the first week of September last, and took several of the second brood of *Lycæna bellargus*; of *L. corydon* I captured seven perfectly fresh males and two females, and saw several others on the wing, but worn; *L. icarus* and *L. astrarche* were fairly common. — I. H. FOWLER; Grove Road, Wimborne, Oct. 1, 1889.

LEPIDOPTERA OF THE NEW FOREST.—I was at Lyndhurst from July 31st to August 5th last, and consequently I read Mr. Blaber's "Notes from the New Forest" (Entom. 261) with a good deal of interest. To the list of butterflies given by Mr. Blaber I am able to add a few other common species which I came across during my visit, namely, *Lycæna icarus* and *L. agestis* (both in bad condition), *Hesperia thaumas* and *H. sylvanus*

(fairly good), and one or two worn-out *Melanargia galatea*. I also saw a couple of very dilapidated *Limenitis sibylla*, and a few worn specimens of *Argynnis adippe* turned up. *A. paphia* was pretty common, but in very bad condition. I can fully corroborate Mr. Blaber's statement as to the failure of sugar: the only insect which came to my sugar was a specimen of *Catocala promissa*, which I unfortunately failed to secure. I may add that I took several male and two female specimens of *Selidosema ericetaria* (*plumaria*), but they (like most of the other Lepidoptera which I saw) were not in good condition.—HENRY A. HILL; 132, Haverstock Hill, London, N.W., Oct. 3, 1889.

FUNGUS PARASITIC ON INSECTS.—My son writes from Paraparaumu, New Zealand (North Island), under date March 16th, 1889, as follows:—"I have obtained a veritable entomological curiosity for you from the mountain ranges on the west coast of this island, facing Cook Straits. It consists of a dark olive-green caterpillar, about three inches long, which, when full-fed, drops or descends from the trees, ostensibly to enter the ground for the purpose of pupation, but which process seems to be arrested by some unknown or mysterious cause, and instead of becoming a pupa, a twig-like plant, sometimes forked, about four or five inches in length, grows, apparently indifferently, either from its head or tail. The Maories pointed the caterpillars out to me, and informed me that they had received £1 for a pair a short time ago from a gentleman who was returning to Europe, and wanted them as a curiosity." No doubt the plant-like appendage to this larva is of fungoid origin.—GEO. J. GRAPES; Berkeley Villa, Charlwood Road, Putney, Sept. 13, 1889.

[Mr. Grapes has been good enough to send for examination the specimens described by his son. They prove to be a well-known fungus, *Torrubia robertsii*, which attacks certain larvæ in New Zealand. We have some of the allied fungi of small size in this country. In the 'Entomologist' for June, 1878 (vol. xi. 121) the British species is figured, and is accompanied by an interesting article by Dr. Buchanan White, who mentions the species sent by Mr. Grapes.—J. T. C.]

CECIDOMYIA LYCHNIDIS (*Heyd.*).—I have met with the larvæ of a Cecid during the autumn months frequenting the upper flower-knops and capsules of the *Lychnis dioica*. I may remark that the stigmatous flowers of the *Lychnis* were affected by the larvæ, which were in fair quantity. Kaltenbach speaks of the larva as occurring at Frankfort-on-the-Maine in similar woolly, deformed knops, and says that the gnats appeared in July. With me they did not emerge till September. Like so many of our Cecid larvæ, they are of a pale yellowish red when matured. The gnat is yellow. The wings are sparingly covered with dark pile, and show the characteristic nervures. I bred fully a dozen, both males and females.—PETER INCHBALD; Grosvenor Terrace, Hornsea, Oct. 11, 1889.

CANTHARIS VESICATORIA AT WIMBORNE.—I caught a perfect specimen of *Cantharis vesicatoria* upon an oak-leaf last June; it is about the size of an ordinary male "Spanish fly." Is this a rare beetle in England?—I. H. FOWLER; Grove Road, Wimborne, Oct. 1, 1889.

INFORMATION WANTED.—Will any readers of the 'Entomologist' kindly give me particulars as to the geographical range in Britain of the

typical forms and varieties of the following species:—*Celana haworthii*, *Grammesia trigrammica* (*trilinea*), and *Apamea fibrosa*? The information is wanted in connection with the series of papers on varieties of Noctuæ now appearing in the 'Entomologist.' I am already indebted to a large number of lepidopterists for useful communications, but I would point out that I get twice the number of communications *after* the species has been dealt with in the 'Entomologist' than before. If those interested would write me a short note on any variation they may have observed in any species about a month or two before such species would be noticed, I could embody their information, and make it generally useful. At present I should be glad of any information regarding *Mianas* and Caradrinidæ, a little later of the Agrotidæ, and so on. Apparently unimportant phases of variation should be mentioned.—J. W. TUTT.

ERRATUM.—On page 243, line 4 from bottom, read "males" instead of "females."—T. H. HALL.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON. — *October 2nd, 1889.* — The Right Hon. Lord Walsingham, M.A., F.R.S., President, in the chair. Mr. Arnold Umfreville-Henn, of Heaton Chapel Rectory, near Stockport, was elected a Fellow. Mr. F. P. Pascoe exhibited a number of species of insects of all orders, collected by himself during the past summer at Brindisi, and in Greece and the Ionian Islands. Mr. J. W. Douglas sent for exhibition specimens of *Lygus viscicola*, Puton, a species new to Britain, taken at Hereford, in September last, exclusively from mistletoe, by Dr. T. A. Chapman. Mr. R. M'Lachlan exhibited nearly one hundred specimens of Trichoptera recently collected in Iceland by Mr. P. B. Mason. Only six species were represented, and of these five had been previously recorded from the island. He remarked on the great amount of variation existing in some of the species. Mr. E. B. Poulton exhibited a mounted specimen of the yellow powder from the cocoon of *Clisiocampa neustria* under a power magnifying 188 diameters. The powder was thus seen to consist of crystals so minute that the form could only just be made out. He said the powder was present in a crystalline form in the malpighian tubules, and was discharged from the anus of the larva. A discussion ensued as to the functions of the malpighian tubes, &c., in which Mr. Stainton, Lord Walsingham, Mr. M. Jacoby, Mr. P. B. Mason, Mr. M'Lachlan, and Dr. Sharp took part. Mr. Poulton also exhibited some photographs of living larvæ of *Hemerophilla abruptaria*, showing different depths of colour which had been induced by experiment; specimens of the larvæ preserved in spirit were also shown, together with water-colour representations of two varieties. He said that, as in other experiments of the kind, the larvæ had been rendered very pale by being surrounded by green leaves and stems only, whereas they became extremely dark when numbers of dark twigs were intermingled with the leaves of the food-plant. All were bred from eggs laid by the same female. Mr. F. Merrifield said that Dr. Chapman had recently obtained similar results from experiments on the larvæ of *Ennomos alniaria*. The Rev. Dr. Walker exhibited, and read notes on, a number of Coleoptera, Neuroptera, Hymenoptera, and Diptera, which formed the second instalment of the collection he had recently made in Iceland.

Mr. R. South exhibited a specimen of *Luperina testacea*, bred from a pupa found at the root of a species of *Silene* at Eastbourne; also a specimen of *Luperina nickerlii*, Freyer, caught in Lancashire last August. He also exhibited, and read notes on, a long series of *Boarmia repandata*, the offspring of parents bred from larvæ collected in North Devon. Mr. Poulton, Mr. Merrifield, and Lord Walsingham took part in the discussion which ensued. Mr. J. J. Walker, R.N., exhibited a number of Coleoptera collected during the past summer in Cobham Park, Kent. Thirty-three species were represented, amongst which were the following, viz., *Eros minutus*, *Philonthus fuscus*, *Homalota hepatica*, *Abræus granulum*, *Anisotoma grandis*, *Agaricophagus cephalotes*, *Thalycra sericea*, *Cryptophagus ruficornis*, *Platytarsus setulosus*, &c. He also exhibited a living larva of *Helops cæruleus*. Mr. Jacoby exhibited a curious phytophagous beetle found by Mr. J. H. Leech in the Corea. He stated that he was unable to determine the genus, as was also Mr. J. S. Baly, to whom he had submitted the specimen. Mr. R. Adkin exhibited specimens of *Retinia resinella*, received by him from Forbes. Lord Walsingham remarked that he had never seen the species in Scotland, but that it was not uncommon in Germany, and he had found it at Hamburg. Mr. W. Dannatt exhibited a male specimen of *Papilio antimachus*, Drury, from Lukolela, a missionary station about 500 miles from the mouth of the Congo. He stated that the species, although very rare, had a wide range, as three other specimens of it had been received from the Stanley Falls, which were more than 800 miles further up the Congo. Lord Walsingham exhibited preserved specimens of the larva and imago of *Cidaria reticulata*, from the Lake District, sent to him by Mr. Hodgkinson. Mr. W. White stated that as some doubt had been expressed at the last meeting as to whether the specimen of *Nephronia hippia*, Fab., var. *gæa*, Feld., which he then exhibited, was hermaphrodite, he had, with Mr. Griffith's permission, handed the specimen to Mr. G. T. Baker for dissection. Mr. J. Jenner Weir exhibited fore wings of the males of *Argynnis paphia*, *A. adippe*, and *A. atlantis*, denuded of the scales, in order to show that there was no dilatation or thickening of the median nervules and submedian nervure in that sex of these species; but that the apparent dilatation was produced by a dense mass of scales crowded together on each side of the nervules. He also read a short paper on the subject entitled, "Notes on the nervules of the fore wings in the males of *Argynnis paphia* and other species of the genus."—H. Goss, *Hon. Sec.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.
—September 26th, 1889. T. R. Billups, Esq., F.E.S., President, in the chair. Mr. J. T. Williams exhibited *Cucullia absynthii*, from Portland. Mr. Wellman, *Plusia chryson* and *Dasydia obfuscaria*. Mr. Jäger, Lepidoptera from the Lake District and the Isle of Man; among those from the last-named place were some interesting forms of *Polyommatus phlæas*, and a small dark form of *Pieris napi*, which species Mr. Carrington said was usually dark in that locality. Mr. Carpenter, *Gnophos obscuraria*, and varieties of *Bryophila muralis*, from Folkestone. Mr. Tugwell, a long series of varieties of *Peronea hastiana*, bred from larvæ collected at Braemar, Aberdeen. Mr. Ince, Lepidoptera from Switzerland. Mr. Adkin, a series of *Hypermercia angustana*, bred from larvæ found feeding in shoots of willow collected in Co. Derry, Ireland. The specimens showed considerable variation, some having the ground colour of the primaries silvery, and the

usual reddish brown central fascia and costal patch intensified; while in others the colour of these markings was almost entirely replaced by dull grey. And from the same locality, *Pædisca semifuscana*, which also showed variation both in the colours and markings of the specimens. Mr. Jenner Weir, chrysalids of *Pieris napi*, to show that, although their colour was very much affected by the environment of the caterpillar at the time of their metamorphoses, yet in no way did their colour approximate that of their surroundings; they were all the produce of one female of the species: those that had changed to chrysalids in an ordinary breeding-case with perforated zinc sides were of a dull cream-colour with black spots, and those that had metamorphosed in a tin gentle-box, with the usual perforations at the top, were of a beautiful apple-green with black spots; they had all been reared from eggs and fed up in a breeding-cage, and those that had become chrysalids in the gentle-box had been placed there a few days before. A discussion ensued, Messrs. Carrington, Tugwell, White, South, Auld, and Weir taking part. Mr. Turner exhibited a varied series of *Triphæna pronuba*, and said that he was in doubt as to which was the var. *innuba*, but that the variation of the species was similar to that of *T. comes*. Mr. Billups, on behalf of Mr. Tearoe exhibited *Apanteles jucundus*, from Deal.

October 10th, 1889.—The President in the chair. Mr. Weir remarked that at the last meeting he exhibited chrysalids of *Pieris napi*, when it was thought by some of the members that the apple-green specimens would, if placed in a strong light, lose their colour. He now exhibited the same chrysalids, which had been exposed for weeks to the direct rays of the sun without the slightest fading in the green colour. Mr. Wellman, light forms of *Gnophos obscuraria*, from Lewes, and it was stated that this light form was only to be met with in that locality; but Mr. Tutt remarked that he had taken one example at Folkestone. Mr. South, referring to Mr. Turner's query as to *Triphæna pronuba* and its var. *innuba*, stated that in the variety the wings and thorax were concolorous. He also exhibited a variety of *Luperina testacea*, and a specimen of *L. nickerlii*, Frr., the latter received from Mr. Baxter, of St. Anne's-on-Sea, Lancashire; also a long series of *Triphæna comes*, and read notes on the marking of the secondary wings. Mr. Carpenter, *Pterostoma palpina*, from Essex, and *Neuronina popularis*, taken at Streatham. Mr. Oldham, several species of Lepidoptera from the Cheshire Mosses. Mr. R. Adkin, examples of *Ellopiæ prosapiaria* and *Boarmia abietaria*, and referring to the view held by some entomologists that larvæ fed upon one particular plant would not readily take to another, said that the larvæ of the last-named species were obtained from fir, and at first fed upon fir and yew, but, upon some birch being put into the cage, they immediately left the other two plants and fed exclusively upon it. Messrs. Carrington, Tugwell, Weir, Cooper, South, J. A. Clark, and others made observations relative to this subject. Mr. Adye, *Sphinx convolvuli*, taken at Christchurch. Mr. C. A. Briggs, an albino form of *Epinephele tithonus*. Mr. Cooper, a bred series of *Deilephila galii*, and stated that he had not been able to find any larvæ of this species during the autumn; Mr. Tugwell said this agreed with his experience. Mr. T. R. Billups, a living specimen of *Gryllotalpa vulgaris*, from Poole, and contributed notes. Other exhibits were made by Messrs. Turner, Step, Frohawk, A. E. Cook, and Fremlin.—H. W. BARKER, *Hon. Sec.*

REVIEW.

The Butterflies of the Eastern United States and Canada, with special reference to New England. By SAMUEL HUBBARD SCUDDER. Three volumes. Cambridge, Massachusetts, U.S.A.

A provisional review of this work was given in the 'Entomologist' for last year (pp. 327-28), on the publication of the first number; the completion thereof, by the appearance of the twelfth and concluding part, affords a convenient opportunity again to revert to it. It would be difficult to over-estimate the great scientific value of Mr. Scudder's *magnum opus*, and all who study it would agree with him that it is "the most exhaustive faunistic work on any insects of any part of the world." These words, however, but feebly convey the great merit of the three volumes; to the biologist, and more particularly to the evolutionist, the manner in which the early stages of the species are dealt with affords material for judging of the relations of the groups of butterflies comprised in the work to each other. For instance, there are three plates of the eggs and an equal number of the micropyles of the eggs, and four of the caterpillars at birth, three of the caterpillars' heads at different stages, and four of the mature caterpillars; then the chrysalids are figured in three plates, and miscellaneous structural details, mostly of the early stages, are figured in two more plates. Besides all this, the neuration of the wings is shown in five plates, and the male abdominal appendages in five more. Great importance is attached by Mr. Scudder to the "scale-patches and folds of the wing-membrane found in the male butterfly," and to the "androconia or scales peculiar to the male sex." The letterpress on these subjects is extensive, and the details of such peculiarities are given in no less than nine excellent plates, many of the figures being highly magnified. Altogether there are eighty-nine plates and three coloured maps, besides portraits of distinguished early American entomologists.

The great charm of the work consists in the manner in which all the dry details are enlivened by the interpolation of an "Excursus"; of these enjoyable essays there are seventy-six scattered through the two first volumes.

The limits of this review preclude the possibility of giving even an outline of the subjects dealt with in these instructive excursi, which are of a most varied character; they deal with butterflies in almost every aspect in which they can be studied, for instance, their ancestry, sexual diversity, ornamentation, geographical distribution, origin of varieties, melanism, albinism, &c.

In a work which has been so admirably performed, it is invidious, perhaps, to draw attention to any shortcoming; but the European student will regret that the author did not see fit to carry out what had once been his purpose, "to make extended comparisons of the species described with their nearest allies outside the region concerned."

The work may be safely commended as full of instruction to all classes of entomologists.—J. J. W.

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PARARGE MEGÆRA.



PARARGE MEGÆRA.

THE very singular specimen of *Pararge megæra*, depicted above, was captured by the late Colonel Cox, of Fordwich, Kent, probably near his residence, as the species used to swarm in the neighbourhood formerly, though now it is less common.

In this example the second nervure of the median vein in each wing is wanting, and, as I have noticed in other insects, when this is the case an additional or enlarged ocellus takes its place towards the hind margin. The spur, which usually runs from the central bar towards the end of the inner margin in the male, seems more to follow the facies of that of the female, and thus forms a band across the fore wing. The usual ocellus is double, with a small dot above. In the secondaries the second and third ocelli unite, and their usual central white dots join into a line, one-twelfth of an inch long. Beneath, the upper wings show respectively six and five ocelli or dots, and the hind wings five and six. The specimen is a male.

In the same cabinet is another specimen without any of the usual tawny colouring near the thorax, the whole of the first two-thirds of the wing being the same colour as the transverse markings.

SYDNEY WEBB.

Maidstone House, Dover, October, 1889.

NOTE ON PARASITES OF *ATHERIX IBIS*, FABR.

My attention has been called recently to the interesting contribution, by Mr. T. R. Billups, on the habits and parasites of *Atherix ibis*, published (p. 193) in August number of the 'Entomologist.'

I was particularly interested in his descriptions of the two hymenopterous parasites reared from it, and write now to correct the generic position assigned them.

Mr. Billups is certainly in error in his generic determinations of these parasites. Figures 5 and 6 do not belong to the genus *Teleas*, but to the genus *Trichogramma* in the family Chalcididæ, sub-family Trichogramminæ. I have reared various species of this genus in America from lepidopterous, hemipterous, and homopterous eggs; also from Coccids. *Teleas*, although an egg-parasite, is widely different, and belongs to the family Proctotrupidæ, sub-family Platygasterinæ. The genus is known at once by having a distinct marginal vein and an oblique stigmal vein, while the hind wings are wider, and the antennæ differently shaped.

Figures 3 and 4 do not represent male and female of a species of *Antæon*, but are male and female of a species of *Megaspilus* in the family Proctotrupidæ, sub-family Ceraphroninæ. I have reared species of this genus from Aphids and dipterous puparia. *Antæon* is a Proctotrupid genus in the sub-family Dryininæ, and shows but a superficial resemblance to *Megaspilus*. It is at once distinguished from it by its more highly developed venation, the front wings having two basal or brachial cells. The genus is probably parasitic on homopterous insects, like an allied genus *Gonatopus*.

W. H. ASHMEAD.

U. S. Dept. of Agriculture, Washington, D.C., Aug. 14, 1889.

[It is pleasing to find that the 'Entomologist' is so critically read by members of the U. S. Dept. of Agriculture, Washington, and I am obliged to your correspondent, Mr. W. H. Ashmead, for calling my attention to the error respecting the genus *Teleas* (Entom. 194), which most possibly is incorrectly named; but, as regards Nos. 3 and 4, I sin in very good company, the insects having been submitted to the Rev. T. A. Marshall, and by him determined as *Antæon alorus*.—T. R. B.]

DESCRIPTION OF TRICHOGRAMMA. Plate 7, figs. 5, 6.

When I drew the figures, illustrated on plate 7 of this volume of the 'Entomologist,' I took careful descriptions of the living insects under consideration. Appended are my notes:—

Fig. 5 —Male, apterous. Antennæ nine-jointed, not including the basal short joint, to which the first long肘ed joint is united; second joint wider, about half the length of first, and pear-shaped; third joint the smallest, very small and collar-like; fourth and fifth of equal size and round, same thickness as the first; the remaining four united as one, forming a club. Head wider than either the thorax or abdomen, closely and firmly set on the thorax. Wings quite rudimentary, merely scale-like, and visible only under high microscopic power. Abdomen slightly wider than the thorax; anal segment furnished with bristles. Legs very muscular, well adapted for leaping. Colour pale ochreous, excepting the abdomen, which is dark brown, inclining to black. Size, the merest speck, only just visible to the naked eye, one hundredth part of an inch being somewhere near the size.

Fig. 6.—Female. Antennæ same as male. Head round, and much smaller than that of the male, and slightly wider than the thorax. Wings: primaries ample and rounded, costal vein only running along the costa, turning before reaching the middle of the costal margin, and then running towards the middle of the wing; the very minute scale-like hairs are arranged in a series of lines, giving a vein-like appearance; fringes long. Secondaries long and narrow, without veins, only one row of scales down the centre; fringes longer than those of the primaries. Legs muscular. Colour: antennæ and legs pale ochreous; head, thorax, and abdomen shining black; costal vein very pale brown; scales on the wings dusky. Size, considerably larger than the male.

Many pairs emerged (from the mass of dead flies, *Atherix ibis*, and their ova) on several consecutive mornings, but they lived only for a few hours. I watched them copulating several times, which process lasts for not more than fifteen seconds. The males are very active, the females more sluggish, when touched, leaping for about half an inch, apparently not using the wings.

F. W. FROHAWK.

Balham, S.W., 1889.

NOTES FROM THE NORTH-WEST COUNTIES.

By J. ARKLE.

With a preceding season like last year's—marked as it was by extraordinary rainfall, low temperature, and early frost—it could hardly be expected that 1889 could be very prolific in Lepidoptera. At any rate my anticipations for this district were not high, and I find their verification to be at least on the same footing as the notes of disappointment which reach me from far

off as well as near correspondents. Still, though hunting has been marred by rain, tempest, and scarcity of quarry, it has been my good fortune to meet, during the season, with extraordinary insects, as well as with entomological matters of interest.

Beginning with Delamere Forest, in Cheshire, the comparative scarcity of *Nyssia hispidaria*, in the early spring, looked like an index to what had apparently been the generally observed character of the year. But later on, at the end of May, three specimens of *Orthosia suspecta*—taken at rest on oak-trunks—amply compensated me for the rarity of *N. hispidaria*, especially as *O. suspecta* figures hitherto unrecorded for the Chester Natural History Society's District,

One or two visits followed during the month of June,—a month which stands out in pleasant recollection as being perfect in warmth and sunshine,—still, the greenwood was so deserted by lepidopterous, and I may add by coleopterous, insects, that I determined to take up an abode near its shades, for a few days, as a thorough test. Here and there one comes across a few scattered houses, where the inmates tell graphic stories of nightly “mosquito” miseries. Forewarned, I therefore chose my lodging outside the wood, and on high and open ground, with every desired result. This visit began on the 11th of July, and from this date the weather completely broke down. Days of rain and lack of sunshine followed each other, until I packed up and returned on the 14th. My captures were—a larva of *Eugonia erosaria*, taken on the trunk of an oak, and now a fine imago; one *Geometra papilionaria*; a dozen or more *Pseudoterpna pruinata* (*cytisaria*), which, by the way, only showed in a few cases the ochreous colour supposed to be due to emergence in wet weather; a series of *Crambus margaritellus* (a plentiful insect, and in fine condition); *Tortrix sorbiana*, *T. ministrana*, *Penthina pruniana*, *Phycis carbonariella* (*fusca*), *Depressaria yeatiana*, and a couple of *Cænonympha typhon*. The scarcity of the latter insect is, I fear, in some measure due to over-collecting since its habitat became so generally known.

My other Delamere captures may be briefly summed up in the following list:—June 22. *Nemeophila russula*, plentiful and fresh from the chrysalis, and early by a fortnight or three weeks; *Cymatophora duplaris*, a few; a couple of *Eucosmia undulata*; *Lomasipilis marginata* in plenty, by a row of willows; *Lycæna ægon*, fairly numerous; but the well-known forms, such as *Aplecta nebulosa*, *Drepana falcataria*, *Ellopiæ prosapiaria*, *Macaria liturata*, *Melanippe montanata*, *M. sociata*, *Thera variata*, *Cabera pusaria*, and *Metrocampe margaritaria*, were extraordinarily rare. Among butterflies the common Whites—usually so conspicuous among the greenness—I failed to notice at all. *Cænonympha pamphilus* and *Polyommatus phlæas* even appeared to be less

numerous than in previous years. Here, as well as elsewhere in the district, *Plusia gamma* was in such numbers as to be a frequent nuisance to the collector, although its usual colleague, *Vanessa cardui*, had been comparatively scarce.

On August 17th I beat from alder a larva of *Drepana falcataria* and a dozen or more caterpillars of *Hadena adusta*, as well as an imago of *Peronea aspersana* from bog myrtle (sweetgale). Larvæ of *Hadena pisi* were also plentiful on this shrub.

My last visit to the Forest was on the 5th of October, when I found an *Agriopis aprilina* drying its wings on an oak; a few more *H. adusta* larvæ; and I beat a score of *N. russula* caterpillars off the sweetgale. I tried, by warmth and fresh food,—plantain for *H. adusta* and lettuce for *N. russula*,—to overcome the disposition of these creatures to hybernate, but the instinct was too strong: *H. adusta* persistently turned in to winter quarters,—each forming a hybernaculum in the soil,—and *N. russula* betook themselves to the gauze covering of their flower-pot, where, for the last fortnight, they have remained motionless in an inverted position. Three captures, on October 5th, of the richly coloured *Peronea mixtana*, and one of the ochreous *Lemnatophila phryganella*, complete this representative list.

A few notes for Chester may now follow those of Delamere. In the early spring the sallows in the immediate neighbourhood showed a marked falling off among the common members of the *Tæniocampa* family. *T. gothica* and *T. stabilis* were most frequently seen; the others were barely represented. In Caughall Lane, an unfrequented bridle-road about four miles from the city,—with a wide stretch of sloe, hazel, willow, and brier wilderness on each side,—I came across a number of night-feeding larvæ on the evening of May 4th. From these I bred fine specimens of *Boarmia repandata*, *Noctua augur*, *Triphæna interjecta*, and *T. orbona*. This night-searching for larvæ of Lepidoptera is very interesting work, and remunerative also. One seldom gets *T. interjecta* fine when caught as a moth. During the night I netted, flying over the grass, a moth I have been thoroughly puzzled with. It has, up to the present, remained unidentified.

The neighbourhood of Chester has, deservedly I think, a bad reputation for “sugaring.” I tried the process frequently in June, but, as usual, without success. On the 18th of May, at Huntingdon Wood,—another of our “localities,” and situated about a couple of miles away,—I took, flying over a sedgy ditch, a number of *Apamea unanimitis*. The moth confines itself to this spot, the probable reason being the presence of its food-plant. *Acidalia remutata* and *Emmelesia decolorata* were also among my captures on this occasion. On the evening of July 2nd, in the Nurseries of Messrs. Dickson and Co., I netted a number of

Platyptilia gonodactyla, flying over the flowers of a species of yarrow.

Why there should have been something like a general expectation—not by any means confined to this district—that we were going to have an “*Edusa* year,” I am unable to say. Our last *Edusa* advent occurred in 1877, when the butterfly was freely taken in June and September. But, as if in defiance of all attempts at fixing another “year” for 1887,—that is, after a mathematical ten years,—the insect ever after refused to show itself. However, strangely enough, I am able to report a capture of, at any rate, one specimen—on the usual sunny, flowery kind of bank the insect loves so well—close to Chester. But more about *Colias* anon.

A more wretched autumn for collecting I do not remember than the present one. The only method practicable, as far as rain and east winds will permit, is that of working the gas-lamps after dark; but even lamp moths have been far from plentiful. I took about the usual numbers of *Eugonia alniaria* (*tiliaria*) and *Anchocelis lunosa*, but *A. pistacina*, *Luperina testacea*, *L. cespitis*, *Orthosia lota*, *Hydræcia micacea*, and *Neuronia popularis* have been few indeed. As I write, *Himera pennaria* and *Hybernica defoliaria* are to be seen occasionally on the gas-lamps. In June I took two or three specimens of *Phibalapteryx vittata* (*lignata*), and, in the early autumn, amongst other Micros, a long series of the pretty *Paraponyx stratiotana*, all from the lamps.

I will now take the reader back to a beautiful day in spring, when, dashing along by rail into North Wales, I continued a long series of attempts at an acquaintance with *Agrotis ashworthii*. It will be understood this is a moth of which it may metaphorically be said that too much should not be told in Gath or published in Askelon. In the same carriage I met a stranger,—a hale, but aged, Welsh minister, who must have been close upon three score years and ten,—and little did I imagine he possessed the key to my puzzle. As the train ran through the green fields and pleasant sunshine we chatted together, as well as my ignorance of Welsh and his limited English would permit, but without touching upon Entomology. By-and-bye we left the train at a wayside station, and bade each other good morning. For the next few hours I worked hard among the slate and limestone mountains, but without success. Just as I was about to give up the task for the day, I was surprised at an unexpected sight again of my reverend friend; and, as I thought some explanation might be opportune, I remarked that I was searching for the larvæ, after hibernation, of a certain insect. To my further surprise he at once quoted the species, but added that my endeavours could be of no avail. He then very kindly directed me to a house, across the valley, where I should find a farmer who had, in his day, collected numbers of *ashworthii* larvæ.

Away I started, and, in climbing up towards the dwelling, I fortunately met a young fellow who turned out to be the farmer's son. With the view of saving time I broached the *ashworthii* question, and he ultimately guided me to the haunts of this local insect. These were simply beetling limestone cliffs, inaccessible to all but a native. With a challenge to "Come on," he at once began the ascent of one. Thinking he only meant climbing up a yard or two I followed, but, with a discretion commensurate with the weight of years, I soon felt a strong wish to descend, and was thoroughly satisfied at accomplishing it. Higher and higher went my friend, until I cordially wished all *ashworthii* at the bottom of the sea. I begged him to come down, but he coolly replied that the only safe way was to return by an easier path from the top. I have no wish to dwell upon the next hour or so, but, to my great relief, he reappeared walking coolly towards me on my own level. He had two *ashworthii* larvæ, but—bleeding hands as well! The caterpillars he had ferreted out from the crevices in the cliff, where, being night-feeders, they secrete themselves by day. The conversation which ensued—all about this rare moth, its collectors, and its dealers—would make a book. By-and-bye my young friend introduced me to an individual who finds a harvest during the season in which the larvæ of this beautiful insect feed. From him I obtained ten caterpillars, and at the close of the day I possessed thirteen, only one of which I took personally,—all the others, as the reader will have guessed, being simply cash transactions. I cannot close these remarks without bearing testimony to the accurate description of the insect given by the late Mr. Newman in his 'British Moths.' On one point alone does my experience differ from it, *viz.*, that all my eleven imagos (two larvæ died) emerged between June 26th and July 3rd, instead of August; but this may be accounted for by the fact—explained no doubt by the splendid June—that all insects have been, more or less, unusually early this season. I found my caterpillars very easy to rear, and, as Newman observes, to revel on sallow.

My record for Wallasey is soon told. I had promised a correspondent some *Taniocampa opima* eggs, and accordingly reached the sandhills on May 18th. Two gentlemen from Bolton joined me in a careful search on the dead ragwort stems, but it was evident these had all been examined long before. At last one of my companions discovered a small batch on an overlooked thistle, and he very kindly shared the eggs with me. The only insects we saw were *Mesotype virgata* (*lineolata*) and *Herbula cespitalis*.

Three times during August did I make a careful examination for *Deilephila galii* larvæ. Like other entomologists who have, this year, sought there for the caterpillars, I did not come across a single trace.

On July 25th I started for a week's collecting in North Lancashire, and across the River Kent into Westmoreland. Rain, as usual, with a scarcity of insects, were the great drawbacks. At Heysham Moss, near Morecambe, I found *Cænonympha typhon* all but over, and *Hyria muricata* (*auroraria*) and *Acidalia fumata* entirely so. My captures were four *C. typhon*, a long and fine series of *Carsia paludata* v. *imbutata*, half-a-dozen fresh *Anarta myrtilli*, and at Hest Bank, a beautiful specimen of *Larentia salicata*. The larvæ of *Vanessa cardui*, *V. atalanta*, and *V. io*—usually so conspicuous here at this time of the year—were entirely absent, owing, I was informed, to the early season. At Witherslack we joined our old friend Mr. H. Murray, whose extraordinary powers of getting across country I observed, as usual, with mixed feelings. Crossing the estuary of the Kent, we proceeded on our way along the embankment which keeps the swollen waters of that river from the surrounding fields. This bank is everything the entomologist can wish for,—sunny, and well clothed with plants and flowers. The day, however, was dull, and our low expectations were such that when a yellow insect started up it was put down as a disturbed *Rumia luteolata* (*cratægata*). By-and-bye another got up; a dash was made for it, but, in reality, it was allowed to escape. After a mile or so we got off the embankment, and took a lot of the pretty *Crambus inquinatellus* and *C. geniculeus*, as we disturbed them from a growth of St. John's wort. The chief insect of our search was *Sciaphilus penziana*,—a thoroughly good insect,—and I was so fortunate as to bring away nearly a dozen of this beautiful species. Other captures were *Boarmia repandata*, *Acidalia ornata*, *Anaitis plagiata* and *C. paludata*. Our return lay along the embankment I have just referred to. The sun had brightened out, and, flying over the flowers, we again saw one of those mysterious yellow insects which had baffled us in the morning. Unmistakably it was a butterfly. Our three nets were at once in operation, and finally the insect fell to Mr. Murray. It was a fresh and perfect *Colias hyale*. Here, also, the idea prevailed that the season would be famous for an appearance in force of *Colias edusa*. It has, since my visit, been verified to some extent by several captures of the butterfly. Another common visitor has been *Sphinx convolvuli*.

Morecambe was, as usual, full of visitors. A great attraction there is the Winter Palace, on the balcony of which, high up, is a large electric lamp. Noticing, one evening, a large number of moths about this lamp, I got permission to take as many as I could. I therefore took up a position on the balcony,—with a glass partition separating me from the crash of the band, and with the sea stretching away into the darkness in front. To the surprise of many observers, of all ages and both sexes, who

evidently looked upon my evolutions with doubt, I took a representative number of insects. They were, however, only *Acidalia dimidiata* (*scutulata*), *Xylophasia monoglypha*? (*polyodon*), *Triphæna pronuba*, and, of course, *Plusia gamma*.

After my return to Chester, and a rest of a day or two, I started again, on August 5th, for Welsh ground. I had accepted a kind invitation from Mr. W. J. Kerr, of Tan-y-Bwlch, Merioneth, to become his guest for a few days. Tan-y-Bwlch (which, in order to satisfy the legitimate curiosity of English readers, I will say is pronounced like Tan-e-Bulk) is situated midway, with a distance of something like ten miles on either side, as the crow flies, between Snowdon on the north and the classical Harlech on the south, and about the same number of miles from the sea. The locality is a well-wooded and lovely vale, shut in by lofty slate or limestone mountains. I arrived *viâ* Llangollen and Bala, on the 5th, in a severe thunderstorm. "After a storm cometh a calm," which, at least, must always be relatively true, so, although the evening was still wet, my host—who had previously sent a man to sugar some well-known trees—and I turned out after insects. Our rendezvous was a sloping bank, just inside an oak wood, and covered with heath and other plants in full bloom. The weather did not prevent us taking *Cidaria prunata* (*ribesaria*), *Noctua xanthographa* (the red form), and the ubiquitous *P. gamma*, at the heath blossoms. At sugar, however, we were only favoured with visits from *X. monoglypha*.

The next day showed the weather had not materially improved. In spite of almost continuous rain I hunted round the sheltered faces of the rocks near. The only insect I met with was the solitary wasp, *Odynerus spinipes*,—commonly enough,—but in every case hidden away in its mud cells from the tempestuous weather. Empty cocoons of *Bombyx quercus*, and of a gregarious member of the Zyganidæ, completed what, under favourable weather, would have been a long list from rock-hunting. Sugar, in the evening, was again a failure, except for the usual visits of *X. monoglypha*.

On the 7th rain fell in the first half of the day. The sun broke out in the afternoon, when I was taken to the borders of one of the numerous oak woods to see *Thecla quercus*, *Argynnis adippe*, and *A. paphia* on the wing. On a bank open to the sun, but sheltered by oaks, and covered with fern, flowers and bramble, the two last-named insects were to be seen in plenty feeding on the flowers of knapweed (*Centaurea nigra*), and sailing up to rest again on the oaks above. I netted a few, but they were all more or less damaged by the stormy weather. *T. quercus* was in tantalizing scores, but not one could we coax within reach. A splendid specimen rose one day from the muddy road, but I missed it. Our captures this day included *Eugonia erosaria*,—

one specimen drying its wings on a grass stem; *Phytometra viridaria* (*enea*); *Larentia olivata*, a very common insect, and obtained by beating; *B. repandata*, and the lovely black-and-white *Ennychia octomaculata*. I was puzzled here, at first, with the local form of *B. repandata*. I had just seen the darker, well-marked Delamere form, and the still darker indistinct species of Westmoreland and North Lancashire; but this approached more in appearance the light markings of the Buckinghamshire *Tephrosia crepuscularia*.

The following day was as fine and sunny as could be desired. Mr. Kerr and I set off, after breakfast, for a tramp through the mountains in the direction of Harlech, on the coast. On the hills in August is not the best time for Lepidoptera; but we came across an occasional *Lycena icarus*, and the irrepressible *P. gamma*, whose pretentious flight made us wish the pursuit it beguiled us into—in the hot sun—had been directed in a better cause. *Aphomia sociella*, *Crambus tristellus*, *C. margaritellus* in ivory and gold, and *C. inquinatellus*, we were able to add to our list of Micros. Two mountain lakes—Upper and Lower Tecwyn—we now passed. The waters of both were as clear as crystal, delicious and refreshing. On the banks of the Upper Lake—that nearest the sea—we halted a few minutes to look at the interesting scene. Around us the auriferous rocks had been disturbed in various places in the late “discoveries” of gold. Many of the stones lying about—in fact, most of them—showed traces of the precious metal, but only as if a brush had lightly touched them with the thinnest possible solution. The workings were therefore deserted. This lake lay in a mountain gorge, at the end of which, through a V-shaped opening just above the lake, we could see, in the clear perspective, the blue waters of Cardigan Bay. Around us rose cliffs to a dizzy height, and, against one of these, sailed a solitary cormorant—the only exception in this picture of still life. Shortly after we were once more in the lowlands, and following the well-shaded line of a clear trout-stream, by which we lunched, in the direction of Harlech Castle. All along we met with *A. adippe*, *A. paphia*, *Hesperia sylvanus*, and, in addition, a few very worn specimens of *A. aglaia*. *T. quercus* was again in plenty, high up around the oaks, whilst *Pararge megæra* and *Satyrus semele* winged their way over humbler haunts nearer ground. And so, through “these delightful pleasant groves,” we arrived, after some fifteen miles of tough tramp, at the estuary of the unpronounceable river which flows into the head of Cardigan Bay. This estuary is guarded by an embankment which is a well-known haunt of *Colias edusa* and *C. hyale*, but it was now too late in the day, and we saw none. We therefore crossed by the railway-bridge to the hotel at Mynydd Junction. Here, according to arrangement, we were met by a groom, and we were soon trotting back, in time for dinner, along

a splendid road, and as fast as a well-appointed trap and thoroughbred could reasonably take us.

Our valuable auxiliary at sugaring, an elderly servitor, had been once again busy with the brush on some trees by a willowed stream, and so we turned out, after dark, to see what sport awaited us. To his quiet disgust there was nothing but a few bat-like *Mania maura* and the intrepid *X. monoglypha*.

I have often seen Snowdon, and stood on its summit, but I never had such a grand, clear view of the noble mountain as we enjoyed that day. This fact, with a sudden fall of the mercury in the evening, prepared us for another break in the weather next day. In the afternoon it cleared up, when, near the famous Black Falls, I beat, from oak and birch, larvæ of *D. falcataria*, *Cymatophora* or, *Notodonta chaonia*, *N. trimacula* v. *dodonea*, and *Amphidasys strataria* (*prodromaria*).

I will now quote, from Mr. Kerr's private collection, a few representative insects, which will show the rich entomological character of this neighbourhood:—*Argynnis selene*, *A. euphrosyne*, *Melitæa aurinea*, *Lycæna ægon*, *Nemeobius lucina*, *Sphinx convolvuli* (a series of over a dozen taken this September at flowers of *Nicotiana affinis*, specially grown for the purpose), *Chærocampa celerio* (one fine specimen, which flew into the house), *C. porcellus* (a long series netted at honeysuckle bloom), *C. elpenor* (a long series taken at rhododendron flowers on the lawn), *Macroglossa bombyliiformis* (another long series, netted also, if I remember rightly, at the same flowers), *Sesia myopiiformis*, *Ino statices*, *N. russula* (a beautiful variety of *Arctia caia*, in which the colours were substituted for each other), *Pterostoma palpina*, *Thyatira derasa*, *T. batis*, *Acronycta leporina*, *A. ligustri*, *Agrotis ashworthii* (unidentified, I think, until I saw it), *Plusia interrogationis*, *Hydrelia unca* (a common insect), *Euclidia glyphica*, *Brephos parthenias*, *Angerona prunaria* (common), and *Melanthia albicillata* (also common).

The following day, August 10th, was a wet one, and ended a most enjoyable visit. I started for home, and my kind host for the moors.

2, George Street, Chester, October 28, 1889.

ENTOMOLOGY OF ICELAND: NOTES UPON A VISIT IN 1889.

BY THE REV. F. A. WALKER, D.D., F.L.S., &c.

(Concluded from p. 275.)

LIST OF INSECTS TAKEN IN ICELAND.

Coleoptera.

Otiorhynchus. Abundant. Reykjavik, Flatey Island, Isafjord, Saudakrok, Stykkisholm, Arnafjord, Reykafjord, and elsewhere.

Creophilus maxillosus. Reykjavik (lane in outskirts of Reykjavik, above cjohn or the lake in rear of the cathedral). Akureyri.

Platysna (Pterostichus) vitreum. Reykjavik, Stykkisholm, Isafjord, Akureyri, Patreksfjord, Reykjafjord, and from other fjords.

Colymbetes. Reykjavik (under stones by margin of lake, about a mile west of Reykjavik).

Calathus melanocephalus. Reykjavik, Flatey Island, Patreksfjord, Saudakrok, and from other fjords.

Amara. Reykjavik, Saudakrok, and from other fjords.

Nebria brevicollis. Reykjavik, Stykkisholm, Akureyri, Seydisfjord, and from other fjords.

Bradycellus. Saudakrok.

Elater, near *Cryptohypnus*. One. Isafjord.

Byrrhus. Reykjofjord, Eskefjord.

Staphylinus, *Philonthus*, or *Quedius*. One. Reykjafjord.

Chrysomela staphylæa. One. Akureyri.

Elateridæ. From one of the fjords.

Notiophilus. From one of the fjords.

Aphodius. Reykjavik.

Almost all the Coleoptera above mentioned were found under stones, with the exception of *Creophilus maxillosus* and *Byrrhus* taken flying.

Lepidoptera.

Crymodes exulis. Reykjavik, Thingvellir. Common. One specimen of very dark type, Krisuvik.

Agrotis cursoria. Four. Akureyri.

Agrotis? Possibly new. Akureyri and Dyrafjord.

Plusia gamma. Reykjavik.

P. interrogationis (two specimens). Thingvellir.

Noctua conflua. Reykjavik, Thingvellir. Abundant. Markings of forewings very variable.

Charæas graminis. Reykjavik, Hafnáfjord, Patreksfjord.

Hadena akureyriensis, suggestive of *pisi*.

Larentia cæsiata. Very abundant. Thingvellir.

Coremia munitata. Reykjavik, Thingvellir. Very abundant. Markings of forewings very variable.

C. propinquata, var. *vatnsmyriensis*? Vatnsmyri Moor. Reykjavik.

Cidaria truncata (russata). Reykjavik, Arnefjord, Dyrafjord, Onundafjord.

C. russata, var. *cjohnensis*. Meadows by cjohn (or lake) in rear of cathedral, Reykjavik.

C. immanata. Abundant. Reykjavik, Arnefjord, Dyrafjord, Onundafjord, Isafjord.

C. marmorata. Abundant. Reykjavik, Arnefjord, Dyrafjord, Onundafjord, Isafjord, Akureyri, Eskefjord.

Pempelia fusca. Common. Thingvellir.

Aphelia osseana. Abundant. Thingvellir, Engey.

Trichoptera.

Limnephilus picturatus. Also common. Very prettily marked. Reykjavik, Thingvellir, Seydisfjord, Isafjord, Engey.

L. griseus. The commonest species and subject to variation in size and marking. Reykjavik, Thingvellir, Siglufjord, Eskefjord, Ofjord (or Akureyri), Isafjord, Engey.

Grammotaulius atomarius. One specimen. Reykjavik.

Hymenoptera.

Bombus hortorum. Reykjavik, Thingvellir, Eskefjord.

Ichneumon albicinctus (female). Engey.

Pimpla sodalis. Thingvellir.

P. sodalis? (possibly female).

Diptera.

Helophilus pendulus. Reykjavik, Engey, Thingvellir, Eskefjord.

Scatophaga stercoraria. Reykjavik, Thingvellir, *et passim*.

Culex pipiens. Reykjavik Hotel, Reykjavik, Thingvellir.

Homalomyia canicularis. Akureyri.

Calliphora erythrocephala. Reykjavik, Engey, Thingvellir, Hafnafjord, Krisuvik, Reykafjord, Akureyri, Vopnafjord, *et passim*.

C. greenlandica. Reykjavik, Hafnafjord, Krisuvik, Akureyri, Vopnafjord.

C. vomitoria. Generally common.

Sarcophaga mortuorum. Reykjavik, Hafnafjord, Krisuvik, Saudakrok, Siglufjord, Akureyri, Vopnafjord, Seydisfjord, Eskefjord.

Scæva pyrastris (black var.). Akureyri.

Simulia reptans. Near Geysir.

Musca azurea. Akureyri.

M. domestica. Reykjavik, &c.

Sphærophoria scripta. Thingvellir.

Drymeia hamata. Thingvellir.

Syrphus nitidulus. Thingvellir.

S. ribesii. Thingvellir.

S. arcuatus. Thingvellir.

Platychirus albimanus. Thingvellir, Reyjavik.

Limnophila arctica. Thingvellir.

L. arctica var. *fuscipennis* near (unless n. sp.). Thingvellir.

The *Otiorhynchus* above-mentioned among the Coleoptera, should be divided into two species, of which *O. monticola* is by far the commonest, being widely distributed, and occurring at nearly every fjord. *O. maurus* is met with at Reykjavik and Thingvellir.

The *Nebria brevicollis* above recorded should by rights be *Nebria gyllenhali*, the same species as Staudinger mentions having found in Iceland. *Nebria gyllenhali* is smaller than *N. brevicollis*, which latter species I captured at Thorshavn, Faroe Isles.

I found *Calathus melanocephalus* at Reykjavik to consist mostly of Staudinger's var. *nubigena* with the black or blackish thorax, very few of the typical form with the red thorax. The

Flatey Island ones are black, so too those from Thingvellir, and those from Onundafjord. The specimen from Patreksfjord is intermediate, the Saudakrok one has the typical red thorax.

Some of the specimens of *Pterostichus* are brownish, others jet black; but the difference in colouring does not constitute them two species.

I am indebted to Messrs. South, Kirby, and Mason for assistance in identifying some of the more obscure of my captures.


Dun Mallard, Cricklewood, N.W.

CONTRIBUTIONS TOWARDS A LIST OF THE VARIETIES OF NOCTUÆ OCCURRING IN THE BRITISH ISLANDS.

By J. W. TUTT, F.E.S.

(Continued from p. 278.)






Apamea, Och., *gemina*, Hb.

The type of this species is represented by Hübner's fig. 482, of which I made the following description:—"Anterior wings blackish grey, with a pale basal line; stigmata faintly outlined, and followed by a pale transverse line, a row of white dots, and a pale toothed line. Posterior wings dark grey, with paler base and dark lunule." Dr. Staudinger writes of the type, "forma obscura magis." This particular form is the one represented in Newman's 'British Moths,' fig. 2, p. 304. It will be seen that very few of our British specimens would answer to the above description, which represents quite a melanic form of the more mottled type. Our specimens of this latter form are generally brownish grey or brown, although I have specimens, taken by the Aberdeen collectors, and others taken by Mr. Percy Russ of Sligo, and Mr. Newman of Darlington, which are either altogether greyish black or otherwise very dark, and closely resemble the type. The species is variable within certain limits, and extends from the more unicolorous type in blackish grey and brownish, through specimens of the same coloration, but with a distinct line under the stigmata, to an extreme variety with all the median space and costal area very dark, and the outer and inner margins pale grey, and bearing a strong superficial resemblance to *Hadena genistæ* in some specimens. The first (mottled) form follows the group,* of which I consider *basilinea* the type, having the short longitudinal basal line and paler transverse lines; the latter (dark central area) forms an extreme development, which I consider typical* in *pabulatricula*, having the development of the dark -like mark under the



* Vide introductory notes to genus *Apamea*.

stigmata, and the central area banded, although there is a complete gradation of intermediate forms. There would thus appear to be two varieties in the unicolorous form,—(1) grey, inclining to blackish, with no brown or very little brown; (2) grey, much suffused with brown, and sometimes entirely reddish brown. In both of these, differences in intensity of colour, and in the development of the tranverse lines, occur. The form most closely allied to these is that in which the dark — -like mark* is developed under the stigmata (var. *intermedia*), and as the space above is generally shaded it gives the specimens a rather banded appearance, as in Newman's 'British Moths,' p. 304, fig. 1, although generally more strongly marked. Of this variety there are two shades of colour, grey and reddish brown. Var. *intermedia* is distinctly intermediate between the type and the next (var. *remissa*, Hb.), where the black — -like mark is extended into a large blackish or brownish patch, extending upwards to the costa between the reniform and orbicular, and connected with another dark patch developed between the two short, longitudinal, basal streaks, and with the space outside the subterminal line of the same dark shade, especially in its central area and at the anal angle; the inner margin of the wing very clear, and almost immaculate. This extreme form is apparently the *remissa* of Hübner and of Treitschke. Of this variety Staudinger writes, "dilutior, variegata." Var. *remissa*, Tr., and var. *intermedia* appear to be united by Guenée to form his var. A, "*La Brouillée*" of Engramelle ('Noctuelles,' vol. v., p. 208), of the general variation of which Guenée writes:—"It is possible that this may be distinct from *gemina*." "This *Apamea* differs from *didyma* by its generally darker colour, its anterior wings generally a little narrower, and above all by a black streak which unites the two transverse lines below the submedian nervure, leaving between this line and the inner margin a space generally paler than the ground colour. Certain subvarieties have all the subterminal space equally clear, and thus somewhat resemble *Hadena genistæ*. These are known in collections as *submissa*." This latter is a very rare development, and appears to be the *remissa* of Hübner, a slightly more extreme development of the *remissa* of Treitschke. The only very extreme specimen I have, in a very long series, came from Mr. Finlay, of Morpeth. The *remissa* of Haworth ('Lepidoptera Britannica,' p. 189, No. 79) is apparently the same as *remissa*, Tr., to which many of our British specimens are referable, while the var. β of his *remissa* appears to refer to Hübner's rather more extreme form. The *oblonga* of Haworth is simply a slight modification of var. *intermedia*, being a grey form with the costal area, containing the grey stigmata, brownish, the — -mark developed, the subterminal line whitish; the dark fuscous type

Haworth calls *obscura*. Mr. Porritt writes, concerning the general variation of this species,—“The pale variegated variety, as well as the dark forms, occur at Huddersfield” (*in litt.*); and Mr. Gregson, ‘Entomologist,’ vol. iv., p. 52, writes, “This does not vary so much here (Liverpool) as in the South (of England). My best varieties of it were given to me by Mr. Doubleday. One is a very *genistæ*-like specimen.” Mr. W. Reid, of Pitcaple (Aberdeen), writing of the Scotch specimens, says:—“The type, together with var. *rufescens* and var. *intermedia* (both *-grisea* and *-rufa*), are all to be obtained in more or less abundance in this district. I once captured a very fine var. *remissa*, which agreed well with Guenée’s description. It had a very light ground colour, with distinct, dark—almost black—markings. It bore a very strong superficial resemblance to *H. genistæ*” (*in litt.*). Tabulating the principal varieties we get:—

1. A dark greyish black mottled form, without the -like mark, = *gemina*, Hb.
2. A reddish or brownish grey mottled form, without the -like mark, = var. *rufescens*.
3. A grey form, with an -like mark under stigmata, = var. *intermedia-grisea*.
4. A reddish or brownish grey form, with an -like mark under stigmata, = var. *intermedia-rufa*.
5. A grey form, with dark blotch between stigmata from -like mark to costa, dark outer margin, = var. *remissa*, Hb.

α. var. rufescens, mihi.—Ground colour reddish or brownish grey, with the transverse lines as in the darker type. As in the type, there is no special development of the claviform or of the darker central area, which become so noticeable in the following varieties. Many of the specimens belonging to the mottled form, taken in the South of England, have a more or less reddish or brownish ground colour. I believe this variety occurs in most localities in all parts of the British Islands where var. *intermedia* and var. *remissa* occur.

β. var. intermedia, mihi.—Under the head of *intermedia* we get two subvarieties; one grey in colour, the other reddish brown. These I have called:—(1) *intermedia-grisea*.—Ground colour grey or greyish brown, with the claviform developed into an -like mark, which joins the median transverse lines, the space between the stigmata being darker than the ground colour, and thus having a somewhat banded appearance. (2). *intermedia-rufa*.—This is like *intermedia-grisea*, but has the ground colour brownish or reddish grey, with the same characteristic markings as in that variety. This would appear to be the “*La Brouillée*” of Engramelle. Guenée writes of it:—“It is distinguished above all by a black mark, which unites the two median transverse lines above the submedian nervure, leaving between it and the internal border (*i. e.*, below the -like mark) a space generally paler than the ground colour” (‘*Noctuelles*,’ vol. v., p. 208). These varieties appear to occur in almost all parts of the British Isles. I have them from Sligo, from Aberdeen, and many other Scotch and English localities.

γ. var. *oblonga*, Haw.—Haworth describes a variety of *gemina* under the name of *oblonga*, treating it as a distinct species. He writes:—"Alis cinereis nebulosis, costa maculâquæ oblongâ fuscis, strigâque albâ posticâ undulatissimâ." "Alæ anticæ longitudinaliter semifuscæ, in quâ parte puncta costalia, apex, et stigmata ordinaria, cinerascunt. Altera pars alæ etiam cinerascit, maculâ majusculâ posticâ cuneiformi fuscâ, et aliâ in medio oblongâ marginem tenuiorem versus. Alæ posticæ albicantes, fimbriâ fuscâ; cætera ut in variis sequentibus" ('*Lepidoptera Britannica*,' pp. 188, 189). This is very little different to some forms of *intermedia*, but seems to have a darker costal area, in which are situated the paler stigmata.

δ. var. *remissa*, Hb.—About the synonymy of this variety there seems to have been some doubt, although Hübner, Haworth, and Treitschke appear to have described rather more or less extreme forms of the same variety under the same name. Dr. Staudinger, however, calls the variety *remissa*, Tr. (why Treitschke I do not know, except that Hübner's rather more extreme form is more rarely obtained), and says of it, "dilutior, variegata." Hübner's figure 423 may be described as having "a pale basal patch, with two short black basal streaks, while the transverse basal line is followed by a large blackish patch extending from the costa, not quite to the inner margin, in which is placed the pale orbicular and the inner half of the pale reniform; the inner margin and space beyond the reniform is pale, with a paler line parallel to the hind margin. Hind wings grey, with the base paler." Haworth's *remissa* is described much in the same way. He writes:—"Alis pallide fuscescentibus nebulosis, lineolis duabus basi, arcuque medio, crassissimo nigricantibus." "Præcedenti (*oblonga*) affinis costâ pallidiore strigâque posticâ minus dentatâ, et fere evanescente; maculâ oblongâ nigrâ superne altè fusco adnatâ et inde stigmata subcinerea arcuatim includente. Posticæ alæ fuscescentes." He also adds that there is a form of this variety, "characteribus pallidioribus, at magis distinctis" ('*Lepidoptera Britannica*,' p. 189, No. 79). Guenée writes of Hübner's *remissa*:—"Superior wings a little more rounded, having the subterminal space, the two ordinary stigmata, a part of the basal space, the inner margin, and an apical patch of a pale greyish ochreous colour, which contrasts very strongly with the almost black colour of the median space." Guenée only gives "North America" as a locality for this variety, but adds directly after:—"I have not seen an example agreeing exactly with Hübner's figure; our European specimens agree more or less with the var. Δ (*i. e.*, var. *intermedia*), of which this variety is only an extreme form. It is, therefore, very possible that it occurs with us, and very probably the specimen which served as Hübner's type was not exotic" ('*Noctuelles*,' vol. v., p. 208). This variety in its extreme form is not common in Britain, but at the same time it is not very rare, and I should most certainly consider Hübner's type an European one. The greater number of our specimens are referable either to the type var. *rufescens* or var. *intermedia*.

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

THE LATE FREDERICK BOND.—I have read with much interest the memoir of our dear old friend, in your magazine of this month, so ably written by Mr. J. W. Dunning. Being probably one, if not the oldest of his entomological friends, a few recollections of him in our early days may not be out of place as a supplement. I made the acquaintance of Frederick Bond at the natural history sales that took place at the Auction Rooms, King Street, Covent Garden, just fifty years ago, and he kindly invited me down to Mount Pleasant, Kingsbury, where he was residing with his step-father, Capt. Bond. I was a frequent visitor after that, generally staying from Saturday to Monday, and used to enjoy my visits very much. We took occasionally little entomological excursions together, in the neighbourhood and elsewhere. At that time he might be called a general lover and collector of all natural history subjects. Nothing came amiss to him in animal life; but his greatest interest was shown for birds and beetles, foreign as well as British. Frequently we used to meet by appointment on Hampstead Heath, to search after *Pæcilus dimidiatus*, which was then not uncommon there, and to the lane where the beautiful *Tychius 5-punctatus* was discovered on vetch by our old friend Frederick Smith. My collecting British Lepidoptera induced him to take that order up, and a series of *Colias hyale* which I gave him in 1842, specimens captured by me near Arundel that year, encouraged him to go on, and resulted in his getting together one of the finest collections of British Lepidoptera in this country, his collection, like my own, being very rich in varieties. I always found him a kind and genial companion, and ever ready to impart information, and shall remember with pleasure to the end of my days the many delightful hours that I spent in his society.—SAMUEL STEVENS; Loanda, Beulah Hill, Upper Norwood, Nov. 2, 1889.

VANESSA ANTIOPA IN HANTS.—While sketching on Friday, November 8th, which happened to be a peculiarly warm day for the time of year, I saw a *Vanessa antiopa*. It flew quite close to me, almost into my face, and I had no doubt of its identity, though I made no attempt to catch it.—L. F. MARINDIN; Liss, Hants.

EPINEPHELE TITHONUS, VAR.—While staying at Perranporth, on the north coast of Cornwall, the last week in August, I caught a variety of *Epinephele tithonus*, which has, under the large black spot in the corners of the upper wings, two smaller ones. It is a female specimen, and, I am sorry to say, rather damaged.—H. J. DIXON; 7, Leamington Park Villas, Acton, October 21, 1889.

DEILEPHILA GALII, PARASITES ON.—On reading the paragraph from the Rev. Mr. Bloomfield (Entom. 280), I placed myself in communication with the author, also with J. B. Bridgman, and having compared notes and insects, have arrived at the conclusion that the parasite is *Trogus exaltorius*, Panz., and not *T. lutorius* as was intended. I hope to refer to the difference between *T. exaltorius* and *T. lutorius* in the next volume.—G. C. BIGNELL; Stonehouse, November 20, 1889.

THYATIRA BATIS VAR. MEXICANA, Hy. Edw.—In looking over some vols. of 'Papilio,' I came across (vol. iv, Jan. 1884, pp. 16, 17), the description of a new variety of *T. batis* named as above, which I quote, as it is

omitted from Mr. Tutt's valuable paper (Entom. xxi. p. 46), and is presumably unknown to British lepidopterists. It "differs from the European form by its larger size, much darker ground-colour of the wings, both primaries and secondaries, and by the pinkish spots having a larger and darker internal shade. The ground-colour of the primaries is rich dark olive-brown; the secondaries the same colour, with fainter median band, and a little lighter shade at the base. Exp. wings 44 mm." This moth was taken in Mexico by Mr. Wm. Schaus, Jr.—T. D. A. COCKERELL; January 8th, 1889.

HELIOPHOBUS HISPIDUS.—I have just most carefully looked through a series of *Heliophobus hispidus*, consisting of thirty-two specimens. Of these, twenty specimens have been captured in Portland during the last sixteen months; the remaining twelve were captured near Torquay some twelve months earlier. They are all in fine condition and very perfect. In them there is not the slightest trace of a violet tinge, and Hübner's figure is characterised by a strong violet colour. Would Mr. South suggest that the "tinge of slaty grey," mentioned by Mr. N. M. Richardson (Entom. 136), is the violet of Hübner's figure? Mr. Richardson, who has (I believe) taken very considerable numbers of this species, cannot see any trace of violet in the Portland specimens. Major Partridge and Lieutenant Brown have, I believe, never taken "violet-coloured" examples. Mr. Tutt asserts that the species at Portland is not like Hübner's figure, and I agree with him; and yet Mr. South judges from the same specimens and finds such a colour. There is, of course, an explanation, *viz.*, that Mr. Richardson has caught this year what he could never get before, *i.e.*, violet-coloured specimens; and if so, it would be most interesting for Mr. Richardson to tell us about them.—WILFRED CARRICK; 67, Avondale Square, Old Kent Road, London S.E., November 5, 1889.

PARASITES ON MOTHS.—From the recent notices on this subject (Entom. 237, 262, 263), these occurrences would appear to have been more than usually frequent during the present season; and it may be worth while to record two further instances which have been brought under my notice by Mr. Ernest W. H. Blagg, of Cheadle, Staffordshire. In September last, he kindly submitted to me two specimens, *Caradrina quadripuncta*, and *Amphipyra tragopogonis*, taken by him at sugar, the wings of which were quite reddened by the presence of numerous Acari with which they were covered, and which proved upon examination to be mature specimens of *Cheyletus venustissimus* (Koch). As the Cheyleti are predatory Acari and apt to fall foul of one another whenever occasion offers, the reason for their thus congregating in such close quarters would form an interesting subject for investigation. Does *C. quadripuncta* pupate in localities where Cheyleti generally abound, such as granaries, stables or chaff-houses; and in what way and at what time is it likely to become infested by these Acari? It is a somewhat singular circumstance that the Cheyleti appear to be attached by the anal orifice to the scales upon the moths' wings, thus remaining fixed firmly, although all the legs are free.—E. BOSTOCK; Stone, Staffordshire, October 23, 1889.

SUGAR UNPRODUCTIVE.—I would like to state, with regard to Mr. Stott's suggestion (Entom. 262) as to the excess of honeydew secreted, and not the sudden fall of temperature at sunset alluded to, being the cause of the

unproductiveness of sugar this season, that during the greater part of the time to which I referred I was working on the Downs at an elevation of about 500 feet, where the vegetation was necessarily stunted and the absence of trees complete. Not only was there the marked absence of moths upon sugar and blossoms, but very little was to be seen on the wing. At the same time I have no doubt that those working in woods and ordinary collecting-ground find the honeydew every year, until washed off by heavy rain, an important factor in their non-success in working sugar or flowers.—ALBERT J. HODGES; 2, Highbury Place, London, N.

NEW VIEWS ON THE SUBORDER HOMOPTERA.—In the 'Entomologist' (p. 269), Mr. G. B. Buckton has contributed his views as to a new classification of the Homoptera, which he calls "Cicadæ." In the course of his remarks he writes:—"And quite lately, Mr. W. L. Distant has divided the Indian Cicadidæ he describes into two groups, which practically separates the singing, from the silent genera. The insects comprised in the latter division must be numerous in the temperate regions of the Himalayas; but to them he does not appear yet to have given a name." Mr. Buckton is mistaken: in my monograph of the Indian Cicadidæ (a family of Homoptera, not the suborder, which Mr. Buckton apparently considers as the same thing), I have divided that family into two groups, separable by the tympana in the males being more or less entirely covered or exposed. I know of no "silent" Cicadidæ. Of the other families of Homoptera, to which Mr. Buckton says I do not appear to have yet given a name, I can only say:—Firstly, I do not deal with them in my monograph; and, secondly, if I did, those families are not in want of new names. A reference to Professor Westwood's 'Modern Classification of Insects,' or to the writings of Puton, Stal, Berg, or other modern authorities on the Homoptera (even including Walker, whom he mentions as a supporter of his own views), would materially assist Mr. Buckton with the suborder of which he has a monograph in preparation.—W. L. DISTANT.

FUNGUS PARASITIC ON INSECTS.—Referring to my note and the editor's remarks on this insect (Entom. xxii. 284), I have received a second letter from my son, giving the following further details:—"The specimens I sent you are rare. They were obtained on the top of one of the spurs leading from the gorge of the Otaki River to the principal ridge of mountains previously mentioned, near Kapiti Island, and were buried perpendicularly in ordinary soil, about one inch below the surface, beneath the overhanging branches of a Rata-tree, — a gigantic vine as large as a full-sized English elm." On perusing Dr. White's instructive article on "Parasitic Fungi" (Ent. xi. 121, 1878), I notice that the allied British species (*Isaria farinosa*) attacks the body of the larva in several parts, whereas the New Zealand species does so, apparently, only in its extremities. I am not aware of any advance in the study of the habits of the latter fungus since Dr. White's article was written, which would unravel the mystery connected with this parasite's *modus operandi* in attacking its victim; and should such not exist, any information on this and kindred points would no doubt be not only highly instructive, but of much scientific value. It is therefore to be hoped that some earnest worker in this branch of natural history may be enabled to investigate the matter to a successful issue.—GEO. J. GRAPES; Berkeley Villa, 34, Charlwood Road, Putney, S.W., November 5, 1889.

ERRATUM.—Page 236, line 30, for "*Expallidana*" read "*parvulana*."

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON. — November 6th, 1889.—Prof. J. O. Westwood, M.A., F.L.S., Hon. Life-President, in the chair. Mr. Richard S. Standen, of Framlingham Earl Hall, Norwich, was elected a Fellow; and the Rev. C. F. Thornehill, M.A., was admitted into the Society. Mr. J. W. Douglas sent for exhibition specimens of *Anthocoris visci*, Dougl., a new species, taken from misletoe, at Hereford, in the end of September last, by Dr. T. A. Chapman; also specimens of *Psylla visci*, Curtis, taken by Dr. Chapman from misletoe, at the same time and place. Mr. R. M'Lachlan exhibited coloured drawings of a specimen of *Zygæna filipendulæ*, in which the left posterior leg is replaced by a fully-developed wing, similar to an ordinary hind wing, and with the neurulation almost precisely the same, but less densely clothed with scales. The specimen was described by Mr. N. M. Richardson in the Ent. Mo. Mag. for June, 1889, and the drawing was executed by Mrs. Richardson. Mr. M'Lachlan also exhibited a female specimen of the common earwig, *Forficula auricularia*, with a parasitic Gordius emerging from between the metathorax and abdomen. He said that it had been placed in his hands by Mr. A. B. Farn, by whom it was taken, and that other instances of similar parasitism by Gordius on earwigs had been recorded. Mr. W. F. Kirby exhibited a gynandromorphous specimen of *Lycæna icarus*, having the characters of a male in the right wings and the characters of a female in the left wings, caught by Mr. T. Brown at Keyingham, Yorkshire, on the 22nd of June last: also a specimen of a variety of *Crabro interruptus*, De Geer, found by Mr. F. Woodbridge in a hole in a log at Uxbridge. Mr. W. L. Distant exhibited a male and female specimen of a species belonging to a new genus of *Discocephalinæ*, from Guatemala, in which the sexes were totally dissimilar, the female having abbreviated membranes, and being altogether larger than the male. Dr. D. Sharp stated that he had observed that in the *Ipsinæ* division of *Nitidulidæ* there was present a stridulating organ in a position in which he had not noticed it in any other Coleoptera—viz., on the summit of the back of the head. He had found it to exist not only in the species of *Ips* and *Cryptarcha*, but also in other genera of the subfamily; on the other hand, he could not find any trace of its existence, except in members of the *Ipsinæ*. He exhibited specimens of *Ips* and *Cryptarcha*, mounted to show the organ. Dr. Sharp also exhibited a box of *Rhynchota*, chiefly *Pentatomidæ*, in which the specimens were prepared so as to display the peculiarities of the terminal segment in the male sex. Mr. R. Adkin exhibited, on behalf of Mr. H. Murray, of Carnforth, a fine series of *Polia xanthomista*, var. *nigrocincta*, from the Isle of Man, and *Cidaria reticulata* and *Emmelesia taniata* from the Lake District. Mr. W. White exhibited a living larva of *Zeuzera æsculi*, and called attention to the chitinous scutum or thoracic segments with several rows of minute serrations, which evidently assist progression. He stated that the larva exudes from its mouth, when irritated, a colourless fluid, which he had tested with litmus-paper and found to be strongly alkaline. Prof. Westwood made some remarks on the subject. Capt. H. J. Elwes exhibited a number of insects of various orders, part of the collection formed by the late Otto Möller, of Darjeeling. Mons. A. Wailly exhibited the cocoon of an unknown species of *Antheræa* from Assam; also a number of cocoons and imagoes of *Anophe venata* from Acugua, near the Gold Coast, West

Africa; specimens of *Lasiocampa otus*, a South European species, which was said to have been utilized by the Romans in the manufacture of silk; also a quantity of nests containing the eggs of *Epeira madagascariensis*, a silk-producing spider from Madagascar, locally known by the name of "Halabe." He also read extracts from letters received from the Rev. P. Camboué, of Tananarivo, Madagascar, on the subject of this silk-producing spider. Mr. H. Goss read a communication received by him from Prof. S. H. Scudder, of Cambridge, Mass. U.S.A., on the subject of his recent discoveries of some thousands of fossil insects, chiefly Coleoptera, in Florissant, Western Colorado, and Wyoming. Prof. Westwood remarked on the extreme rarity of fossil Lepidoptera, and called attention to a recent paper by Mr. A. G. Butler, in the Proc. Zool. Soc., 1889, in which the author described a new genus of fossil moths belonging to the Geometrid family *Euschemidæ*, from a specimen obtained by Mr. A'Court Smith, at Gurnet Bay, Isle of Wight. Mr. F. P. Pascoe read a paper entitled "Additional Notes on the genus *Hilipus*," and exhibited a number of new species belonging to that genus. The Rev. Dr. Walker read a paper entitled "Notes on the Entomology of Iceland." Mr. Roland Trimen asked if any butterflies had been found in the island. Dr. Walker said that neither he nor Mr. P. B. Mason had seen any during their recent visit to Iceland, nor were any species given in Dr. Staudinger's list. In reply to a question by Mr. G. C. Champion, Mr. Mason said that during his recent visit to Iceland he had collected nearly a hundred species of insects, including about twenty Coleoptera. He added that several of the species he had taken had not been recorded either by Dr. Staudinger or Dr. Walker. Capt. Elwes enquired if Mr. J. J. Walker, with his great experience as a collector in all parts of the world, was aware of any land except Iceland, outside the Arctic Circle, from which no butterflies had been recorded. Mr. J. J. Walker replied that the only place in the world which he had visited, in which butterflies were entirely absent was Pitcairn Island.—H. Goss, *Hon. Secretary*.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.
—The Annual Exhibition was held at the Bridge House, London Bridge, S.E., on Wednesday and Thursday, the 30th and 31st of October. Besides the class Insecta, the exhibits comprised birds, birds' eggs and nests, fish, reptiles, Mollusca, and Crustacea; geological and botanical specimens; paintings, engravings, &c., of natural-history subjects. There was a good display of microscopic objects and apparatus, no less than thirty exhibitors showing in the room set apart for them. Among the principal exhibitors of Insecta were Mr. H. Burns, with nests of living British ants, taken, among other localities, from Lambeth and Conway Castle, the species being *Formica fusca*, *Lasius flavus* (with queen), *L. niger*; there was also a nest from Boulogne. Mr. R. M'Lachlan, with European Neuroptera, *Ascalaphus*, *Nemoptera*, and Perlidæ; also specimens of Orthoptera from Burmah, *Megalodon ensifer*, Brullé. Mr. Eland Shaw also exhibited Orthoptera. Hymenoptera, Hemiptera, and Diptera were shown by Messrs. T. R. Billups, S. Robinson, and Miss M. Kimber, the latter an interesting case of *Sirex gigas* and *S. juvenus*, with lead piping, showing the ravages of the larvæ of these species. Mr. T. R. Billups put in his fine collection of British Coleoptera; Messrs. C. H. Goodman, W. West, and Rev. W. F. Johnson also exhibited in this order, the latter with rare and local Irish forms. The principal exhibitors among the Lepidoptera were

Mr. J. H. Leech, with nearly the whole of the known species of the Palæ-arctic Catocalidæ, one of the most attractive features of the Exhibition. Mr. Murray, series of *Polia xanthomista*, *Cidaria reticulata*, and dark forms of *Emmelesia taniata*, bred during the year. Mr. Austin, varieties of *Argynnis aglaia* and *Lycæna icarus*; also series of *Angerona prunaria* and *Gnophos obscuraria*, both showing a wide range of variation. Mr. A. C. Vine, specimens of *Deilephila livornica*, *Chærocampa celerio*, *Coccyx scopariana*, *Lita leucomelanella*, and *Nepticula fulgens*, and an undetermined *Gelechia* bred from *Genista tinctoria*. Mr. R. Adkin, Rhopalocera from his collection, together with long and variable series of *Pieris napi*, *Lycæna icarus*, *Epunda lutulenta*, and many other species, taken in the north of Ireland and North Wales; also a long series of *Acidalia marginepunctata* from Sussex, showing great variation. Mr. J. R. Wellman, four drawers from his collection, including Sesiidæ, and fine and variable series of the *Acidalia* and *Eupithecia*. Mr. J. A. Clark, a series of cases illustrating the life-history of *Cossus ligniperda*, with sections of various trees, showing the destructive powers of the larvæ. Mr. G. Elisha, the whole of his collection of the British Tinæ. Mr. G. J. Grapes, larvæ of *Hepialus virescens* from New Zealand, attacked by fungi. Mr. Machin, Bombyces, amongst which were a fine variety of *Bombyx trifolii* and a series of *Lasiocampa ilicifolia*, full series of the Drepanulidæ, *Dicranura bicuspis*, and black specimens of *Stauropus fagi*. Mr. Schooling, yellow specimens of *Zygæna filipendulæ*, and varieties of *Triphæna fimbria*. Mr. R. South, British Tortrices, comprising, amongst others, long and variable series of *Leptogramma literana*, *Peronea cristana*, *P. hastiana*, and *Teras contaminana*. Mr. C. B. Smith, *Eugonia autumnaria*, taken this year. Mr. Vaughan, fine varieties of Rhopalocera and of *Arctia caia*. Mr. Tutt, series of all the British species of the genus *Xanthia*, arranged to show the extreme intermediate forms of variation; also a very complete collection of the British Pterophori, giving locality and dates of capture. Mr. Barren, *Argynnis paphia* and var. *valexina*, with intermediate forms. Mr. Adye, several of the rarer Sphinges. Mr. West, of Greenwich, two drawers of British Tortrices, containing the Tortricidæ and Penthinidæ. Mr. Tugwell, striking varieties of the Geometridæ; bred specimens of *Boletobia fuliginaria*, with cocoon, from Bankside, Rotherhithe; long series of *Deilephila galii*, varieties of *Arctia mendica*, *A. menthastri*, and *A. lubricipeda* from English, Scotch, and Irish localities. Mr. C. A. Briggs, Scopariidæ from Hebrides, Orkneys, Shetlands, Ireland, Wales, Scilly Isles, &c. Mr. A. J. Croker, life-histories of British species and varieties of Lycænidæ. Mr. Albuary, varieties of many species. Exotic Lepidoptera were shown by Mr. Jenner Weir. Mr. W. Dannatt, Ornithoptera from the East Indies and Malay Islands, &c. Mr. S. Edwards, Papilionidæ from India, North and South America, &c. Mr. A. H. Jones, European Papilionidæ, Pieridæ, and Apaturidæ. Mrs. Hutchinson, Miss Adkin, Miss Billups, and Messrs. H. A. Auld, O. C. Goldthwaite, T. W. Hall, J. Jäger, E. C. Joy, C. Levett, B. L. Nussey, C. Oldham, C. H. Williams, G. B. Ashmead, H. T. Dobson, and many others assisted by exhibiting. During each evening, Mr. G. Day delivered two short lectures, which were illustrated by the Triplexicon lantern; and there was a table set apart for the display of fungi by the Exhibition Committee, assisted by Mr. Step. This Exhibition is the most successful that the Society has given; during the two evenings on which it was open, close upon 2000 visitors having gone through the various rooms.

October 24th, 1889.—T. R. Billups, Esq., F.E.S., President, in the chair. Messrs. W. Mansbridge, V. Gerrard, C. H. Collings, H. C. Pickard-Cambridge, J. T. Winkworth were elected full members; and Messrs. C. J. Wainwright and A. Ford as country members. Mr. Wellman exhibited series of the second brood of *Acidalia marginepunctata*. Mr. R. Adkin, specimens of *Retinea resinella*, with pupæ and cocoons, and read notes on the life-history of the species. Mr. W. West, *Gordius aquaticus*, and contributed notes. Other exhibits were made by Messrs. Tugwell, J. J. Weir, Ince, Adye, Moore, Fremlin, Auld, Mera, Manger, and by Mr. Billups, on behalf of the Rev. W. F. Johnson and Mr. G. J. Grapes. —H. W. BARKER, *Hon. Sec.*

REVIEWS.

A Monograph of Oriental Cicadidæ. By W. L. DISTANT. Published by order of the Trustees of the Indian Museum, Calcutta. Part I. pp. 24, 2 plates. Royal 4to. 1889. London: King & Co., E. W. Janson. Calcutta: India Museum, and Thacker, Spink & Co. Berlin: R. Friedlander & Sohn. In parts, five shillings each.

Mr. Distant has long been celebrated for his monographs of certain groups of Eastern Insects. In this he bids fair to excel those already issued by him. The fauna of the Cicadidæ treated in this work comprises Continental India, Ceylon, the islands in the Bay of Bengal, Burma, the Malay Peninsula, the Malayan Archipelago, and China and Japan. This area was not chosen by the author, but was selected at the request of the Indian Museum authorities. No monograph has previously been attempted, and Walker's "species" will now be analysed, and, where admitted, figured. Most of the Continental museums have placed the whole of their collections of the family in the hands of the author, who, with his own unrivalled collection, and those of the Calcutta and British Museums, has seen all available material.

The author has written in the style of his 'Rhopalocera Malayana,' to which this will form a companion volume. The production of the work is alike admirable for its scientific value, the accuracy of drawing of figures (some being coloured) on the plates, which are by Mr. Horace Knight, and the general production by Messrs. West, Newman & Co. It will evidently become a standard work on the Eastern Cicadidæ.—J. T. C.

Notes on an extraordinary Race of Arctia mendica, Linn. By GEORGE T. PORRITT, F.L.S., &c. 2 pp. 8vo, 1 coloured plate.

This is a reprint of a paper read before the Ent. Soc. Lond., July 3rd, 1889, and will be found useful to those who make special study of variation in the Lepidoptera. Most of the remarkable forms figured are now well known to British lepidopterists, but they have not hitherto been figured for comparison upon one plate. When thus seen, we get a better estimate of the value of variation, which in this case seems to point to an immediate formation of a very distinct local race—dark, like some Lepidoptera occurring in Lancashire and Yorkshire, if such race has not long existed near Huddersfield, and been overlooked, which seems improbable. —J. T. C.

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Great deeds are done and great discoveries made."

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—
1890.

"It is interesting to contemplate a tangled bank, clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling through the damp earth, and to reflect that these elaborately constructed forms, so different from each other, and dependent upon each other in so complex a manner, have all been produced by laws acting around us. These laws, taken in the largest sense, being Growth with Reproduction; Inheritance which is almost implied by reproduction; Variability from the indirect and direct action of the conditions of life, and from use and disuse: a Ratio of Increase so high as to lead to a Struggle for Life, and as a consequence to Natural Selection, entailing Divergence of Character and the Extinction of less-improved forms. Thus, from the war of Nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows. There is a grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being evolved."—DARWIN.

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VALEDICTORY.

WITH the present number the 'ENTOMOLOGIST' changes its proprietorship, a change which has only been made once previously during half a century, and was then from father to son. Founded by the late EDWARD NEWMAN in 1840, it was continued for two years, and then became the 'ZOOLOGIST,' a magazine which was to include, as it does to this day, diverse branches of Natural History.

By the year 1864, however, the entomological communications had so increased as to demand a separate publication, and the 'ENTOMOLOGIST' was re-created to receive them. My late father again edited the journal, and continued to do so until his death in 1876.

After his death, Mr. CARRINGTON became Editor, assisted in his duties by Messrs. BOND, FITCH, FREDERICK SMITH and JENNER WEIR, Dr. POWER and Dr. BUCHANAN WHITE; and on the deaths of Mr. Smith and Dr. Power, Messrs. SOUTH and BILLUPS consented to join the staff. For their generous and long-continued service, my hearty thanks are due to all these gentlemen, as well as to our many contributors; our relations have always been most pleasant and cordial.

It is not without much regret that I have consented to forego a proprietorship which has become almost a family tradition, and to break this long-established connection of editors and proprietor. But it is the official bond only which is severed; the friendship remains unimpaired.

Under the proprietorship of my successor, Mr. J. H. LEECH, the 'ENTOMOLOGIST' will, I am convinced, become increasingly valuable; and for him and his Editor, Mr. SOUTH, who is already well known to them, I would ask the continued support of all our readers.

T. P. NEWMAN.

It is with feelings not unmingled with regret that, by force of circumstances, I retire from the position of Editor of the 'Entomologist.' It is, however, very gratifying to me to remember that during the period—now more than thirteen years—I have edited this magazine, I have received such uniform support from its contributors and readers. To them I tender my hearty thanks. It is a further satisfaction to feel that, in all those long years, no word I have placed in its pages has lost to me a single friend; but my association with the 'Entomologist' has introduced me to many whose friendship is greatly valued.

To those whose names have appeared on the title-page, in connection with mine, I also tender my thanks,—to each in measure as they have individually responded to my appeals for assistance.

Lastly, I must thank Mr. T. P. Newman for his support, without which it would have been impossible to have gained for the 'Entomologist' such success as it has attained.

JOHN T. CARRINGTON.

HESPERIA LINEOLA, OCHSENHEIMER: AN ADDITION TO
THE LIST OF BRITISH BUTTERFLIES.

By F. W. HAWES.

THE specimens,—three in number, all males,—from which the accompanying description is made, were taken by me during the month of July, 1888, in one of the eastern counties, and remained until quite recently in my cabinet, merely as curious varieties of *Hesperia thaumas*. Happening, however, one day last month, to turn over those plates in Dr. Lang's 'Butterflies of Europe,' on which the genus *Hesperia* is figured, I was struck with the great resemblance of my specimens to a species represented at Plate 81, fig. 10. A reference to the description at p. 351 of that work suggested the probability of the so-called varieties being in reality *H. lineola*, the three main points of distinction between *H. lineola* and *H. thaumas* appearing in strongly marked contrast when the specimens under consideration were compared with undoubtedly fresh examples of *H. thaumas*. In the course of the week following my supposed discovery Mr. Carrington spent an evening with me looking over my collection of Diurni. To him I communicated my beliefs, at the same time showing him the specimens, and he confirmed my opinion that I had, indeed, British examples of *H. lineola*. Since then we made a visit to the Doubleday collection at the Bethnal Green Museum, when, whatever doubts I may have had, were at once dispelled, my specimens being exactly similar to the five males contained in the Doubleday European collection, although two of my three are larger, and one is distinctly finer than the examples labelled "*lineola*, France," in that collection.



1. *H. lineola*. 2. *H. thaumas*.

I believe *H. lineola* has been overlooked owing to its great similarity to *H. thaumas* in appearance, and the fact that it flies at about the same time of year (or possibly a week later) in the same localities as the commoner insect. If all collections in this country, consisting avowedly of British insects, were carefully examined, I have little doubt that native *H. lineola* would be found hidden away in some unexpected corners. At any rate, an examination of localities known to produce *H. thaumas* may result, during the coming season, in the capture of this butterfly in widely different parts of the British Isles. The known range in Europe extends, according to Dr. Lang's work, from Scandinavia in the north to North Africa in the south.

To proceed to a comparison between *Hesperia thaumas* and *H. lineola* for the purposes of distinction, it will be noticed, from the figures given of one anterior wing of each of the male butterflies, that the black bar on the fore wings in *H. thaumas* is decided, continued, and bent slightly downwards at about the centre. In *H. lineola* the bar is narrow, broken, and has no curve, is frequently very indistinct, and always considerably shorter than in *H. thaumas*. Again, in *H. thaumas* the bar springs from a point at about one-third of the length of the inner margin, reckoning from the thorax; in *H. lineola* the bar appears almost to run into the base of the wing at its juncture with the thorax. These are characteristics of the male insects only, and the remaining points of difference apply equally to both sexes. Perhaps the most positive and unfailing distinction in both male and female *H. lineola* is to be found in the coloration on the under side of the antennæ. In *H. thaumas* this tint is of a faint buff, never dark; whereas in *H. lineola* the under side of the tips is of a decided black. A third point of difference is the absence, in *H. lineola*, of the fulvous patch on the inner margin of the under side of the hind wings, the insect in this respect bearing a considerable likeness to *H. actæon*. These three, then, are what may be called the distinguishing features of *H. lineola*, when compared with *H. thaumas*; but there are other minor and less perceptible differences, i. e., *H. lineola* has a duller and more suffused appearance, especially at the hind margins, more decided neuration of the hind wings, and on the under side a greenish hue; whereas *H. thaumas* has a rich glistening colour, is usually clear at the hind margin, and has a grey appearance on the under side. The two species approach each other very closely in size; perhaps *H. thaumas* is a trifle more elongate (see fig.) than *H. lineola*.

I venture no opinion now as to the right of *H. lineola* to be considered a distinct species. The position of *H. lineola* in our collections is between *H. thaumas* and *H. actæon*.

I may say here, however, that I hope I may be able in course of time to supply a life-history of this new addition to our Rhopalocera in all stages from British parents.

Since writing the foregoing I find that Mr. J. T. Carrington captured in 1889, also in the same county in which I took my specimens, several examples of *H. lineola*, including females. They were taken at some considerable distance from the first-named locality, but about the same time of year, although one season later.

NOTES ON *AGROTIS ASHWORTHII*.

BY WILLOUGHBY GARDNER.

OF the many interesting species of Agrotidæ inhabiting the British Islands, none have had a greater fascination for the writer for many years past than *Agrotis ashworthii*.

Who, indeed, that has seen the delicate dove-colour upon the wings of this insect, when freshly emerged from the pupa, can help being perpetually captivated by its quiet and unassuming beauty?

Beyond the attractiveness of the imago itself as a beautiful object in Nature, the history of the species, its habitat, and a certain justifiable pride in an insect peculiar to one's own home district, have tended to keep up a perennial interest in *ashworthii*.

Running in a northerly direction from Llanymynach, in Shropshire, through Denbighshire and Flintshire to the sea, and thence, with a slight break, due west along the coast as far as the Great Orme's Head, is a narrow strip of what is known to geologists as carboniferous limestone. This strip of limestone rests unconformably upon a series of hard slaty Silurian rocks, which crop out from below it to the west and south of its course, while to the east and north it dips more or less suddenly beneath newer beds of coal or sandstone or the sea. At intervals between these two extreme points the ridge forms magnificent and picturesque escarpments, often rising to cliffs several hundred feet in height: these are seen at Llanymynach itself, at Llangollen, near Mold, at Llandulas, and at other points.

It is a curious and most noteworthy fact, that wherever the carboniferous limestone crops up upon the surface of the earth in this country, there a perfect treasure-hoard of objects of interest, for the student of nearly every branch of science, is accumulated, such as is to be found on no other geological formation.

The entomologist finds upon these long limestone escarpments many rare and interesting insects. Among these may be noted particularly *Procris geryon*, *Mamestra furva*, *M. abjecta*, *Agrotis pyrophila*, *A. lucerneæ*, and, foremost and most attractive of all, *Agrotis ashworthii*. Upon this notable, and in so many ways famous, ridge of rock, this species has its home; here it was first discovered, here it still thrives and multiplies, and beyond it rarely seems to stray.

This beautiful and scarce insect was first discovered by the late Mr. Joseph Ashworth, an ardent entomologist, who resided for some time at Bron Hyfryd, near Llangollen: this house is close by the finest cliffs along the whole range of the above-mentioned limestone rocks, which are known here by the name

of the Eglwsegs. Along these rocks Mr. Ashworth collected with much industry and perseverance, securing many scarce species; chief among these was the *Agrotis* which bears his name. With Mr. Ashworth's death, however, the exact whereabouts of the habitat of *ashworthii* appears to have been lost for some time, till it was re-discovered, somewhere about twenty-five years ago, by the late Mr. Nicholas Cooke. This eminent and indefatigable entomologist started one day at 6 A.M. upon a rocky crag at one of the traditional spots, and worked straight ahead for full twelve hours without a break, till success crowned his efforts. From that time to the present the study of *A. ashworthii* in its natural haunts, amid some of the most charming bits of rock scenery in Wales, has afforded delight and pleasure to many a friend of the re-discoverer of the species.

The imago of this *Agrotis* usually makes its appearance about the beginning of July, though it is very much later in certain seasons, being found occasionally freshly emerged during the early days of August.

Pairing soon takes place, and the eggs are generally deposited upon the wild thyme, the favourite food-plant of the insect; these, pale white and very conspicuous at first, soon grow darker in colour, and hatch out in warm seasons at the end of about twelve days. The little larvæ are very active from the day of their birth, "looping" along just like a Geometer. They appear to be somewhat delicate in their earlier stages, and do not take kindly to any food, even their native wild thyme. They feed only at night, and by day hide themselves most effectually among the herbage and loose clods of earth; as autumn approaches they stow themselves away in snug corners for the long winter sleep, having now attained to fully half their size. Hybernation lasts no longer than the first warm sunny days of spring, when the larvæ come forth again with appetites whetted by the long fast. Now they seem to be much less particular in their diet, for they will feed greedily upon very many of the plants they find around them: among these food-plants may be mentioned, in addition to wild thyme, golden-rod, sun cistus, fescue grass, and various hawk-weeds. I have never noticed that sallow was touched by them in a state of nature, but in confinement they will greedily devour both the leaves and catkins. The larvæ are generally full fed about the middle of May, but the time varies by a fortnight earlier or later, according to the season. They then bury themselves in the ground, turn to pupæ, and in due course produce the perfect imago.

Though sombre in tone, like the perfect insect, the larva of *ashworthii* is eminently striking in appearance; its body is smooth and cylindrical, of a smoky green colour, carrying upon the back of each segment a large oblong mark of most intense

velvety black ; a bright red shining head and red-brown prolegs stand out in strong contrast, giving the caterpillar a decidedly *distingué* aspect, which at once marks it out from the common herd of Noctuæ.

The indescribably beautiful dove-colour of the fore wings of the perfect insect has already been alluded to. As in so many other living things, this ebbs away sadly with the life of the insect. Across the wings run three wavy dark lines ; between the second and third is a rich brown shade, very much enlarged in the female, almost absent in the male ; within this patch of colour the orbicular and reniform are more or less conspicuous, according to the intensity of the shade ; the hind wings are smoky grey ; and the head, thorax, and body pale blue grey, like the fore wings. Though simple and quiet in colouring, the imago of *Agrotis ashworthii*, like its larva, is at once beautiful and striking, and cannot possibly be mistaken for any other British species.

Now in writing thus of the life-history of *A. ashworthii*, the question naturally suggests itself, How comes it that this particular Noctua is confined to so limited a habitat, and is, so far, unknown to exist elsewhere ?

The Entomological fauna of the greater part of Europe has now been pretty thoroughly investigated, and much collecting has been done in various other parts of the world, yet *A. ashworthii* has never yet been discovered in any other locality. Why is it that the insect has never strayed from its native Welsh mountains, while most species of these temperate climes have so wide a range of habitat ? How long has it existed and flourished there, and where did it originally come from, leaving apparently no trace of its kindred behind it ? Who can tell ?

Its food-plant is no rare and local herb ; the wild thyme, rock cistus, and other plants upon which it thrives, are common in many other places. The geological formation which it prefers is a limestone found in many parts of Great Britain, as well as on the Continent of Europe and elsewhere. Its habitat is neither alpine, insular, nor peculiar as to climate or otherwise ; and yet our insect seems debarred, in some mysterious and extraordinary way, from straying abroad from its own particular adopted home. It cannot, of course, have existed there always, but must have travelled westwards with one of the great waves of life which invaded these islands from the Continent some time after the close of the last glacial epoch. Still, impelled by some curious impulse, it has journeyed straight to its present mountain home, leaving no colonies in similar situations behind it in its course, nor, apparently, any survivors in the original cradle of its race.

The species of *Agrotis* which it most resembles is the continental *A. candelarum* (Staud.). This somewhat rare insect has a

range across Central Europe, from the Ural Mountains, through Poland, Germany, and Switzerland, as far as the western provinces of France. The imago is not unlike that of *A. ashworthii*, but the fore wings are of a more *ashy* grey, varied with red; the larva, though different in colour from that of *ashworthii*, resembles the latter in having a series of deep black marks along its back, which are, however, arrow-head-shaped instead of square. It feeds upon various low plants, such as golden-rod and dock, the first-named of which is included in the pabulum of *ashworthii*. It is possible, therefore, that the immediate ancestor of *A. ashworthii* may have been the European *A. candelarum*, though ours is now quite a distinct species from the continental insect. Neither the larva nor the imago of *ashworthii*, as found in its Welsh mountain home, now shows the slightest inclination to "cast back" to an earlier type such as *candelarum*; and indeed, in the course of a long experience of the insect, the writer has been struck by the *very slight* tendency to variation exhibited by our species.

Unlike many rare animals and plants which have found a last resting-place in some out-of-the-way corner of the globe, there to dwindle away till they become extinct from natural causes, *Agrotis ashworthii* seems to thrive and multiply in its native haunts. Long may our unique and interesting local *Noctua* continue to do so!

Liverpool, November 10, 1889.

AN ENTOMOLOGICAL TOUR ON THE TABLE-LAND OF MOUNT ARTHUR.

By G. V. HUDSON, F.E.S.

DURING the summer of 1888—9 I spent a week on the table-land of Mount Arthur for the purpose of investigating the insect fauna of the locality, and, as it presents some marked and interesting peculiarities, perhaps it may be desirable to place my observations on record, and also, for the benefit of future naturalists, to give a few practical hints as to the best way of reaching the locality, and what to do when there.

Mount Arthur is the highest peak on the western side of Blind Bay, and is always a conspicuous object from the town of Nelson. The table-land is situated behind the mountain range,—that is, on the north-western side of it,—and extends for about ten miles in the same direction, till we reach Mount Peel. Its width is not so great, being, I should say, from five to eight miles; but, owing to the broken nature of the country, it is evidently hard to say, especially as there is so much high land

all round. This plateau varies from 3600 to 4000 ft. above the sea-level, and is covered with mountain birch, traversed by many singular openings, which support a dense growth of tussock-grass and numerous alpine plants. The mountains easily accessible are Gordon's Pyramid (4600 ft.), Mount Arthur (5800 ft.), and Mount Peel (5500 ft.). The varying elevations which are traversed in ascending these gives the naturalist a rare opportunity of observing and collecting an extremely interesting series of alpine plants and insects. Respecting the former I can give no information, but feel sure that a visit to the table-land would amply repay any botanist who was not afraid of a little hard work. As to the best means of reaching the table-land, it of course depends entirely upon whether we make Nelson or Motueka the base of operations: in either case a horse and trap is required, but while a whole day's driving is necessary from Nelson, less than half the time is needed from Motueka to reach the Graham's River. This is a small branch of the Motueka River, which rises in the Mount Arthur range, and flows into the main stream about fifteen miles above the town. After crossing the Motueka a short distance above the mouth of the Graham a fairly good road takes us to Heath's, where it is usually convenient to stop the night before continuing the journey. Arrangements can also be made with Mr. Heath to carry the bulk of one's impedimenta by pack-horse on to the table-land, which is a great assistance, especially as it is necessary to take provisions for the whole time one intends to remain there, and an abundance of clothing to put on during the cold nights.

As soon as the usual hideous stratum of burnt logs, which surrounds almost all cultivation in New Zealand, is passed, the forest becomes extremely beautiful, and the views which one obtains from the back, as it passes up the side of the Graham River, are really very fine. About four hours' hard climbing from Heath's brings us to the saddle at an altitude of about 3000 ft. above the sea-level: here the source of the River Pearse is crossed, where several interesting Neuroptera can be captured, a delicate species allied to *Hemerobius* being one of the most conspicuous. Just before we cross this stream a fine view of Mount Arthur is to be seen through an opening in the trees. From this point the track gradually descends, following the sea of Flora Creek for a matter of ten miles, and passing through dense birch forest all the way. Here on favourable days in January and February may be seen the rare and beautiful *Dodonidia helmsii* flying quietly about in and out of the sunshine, and settling on the branches just out of reach. I may state that four specimens of this butterfly only have at present been taken, and that the British Museum are much in want of a type; so perhaps visitors to this locality may be good enough to look out for the insect, and obtain one for the National Collection. I

think it will be found on most of the wooded hills in the Nelson Province between 2500 and 3000 ft., as I took a poor specimen on the Dun Mountain (1885) in quite a different neighbourhood. It is also said to have occurred on the hills on the other side of Wellington Harbour, but I have not seen it.

About two miles after we leave the source of the Pearse a small clearing is reached, called Flora Camp, which is a convenient halting-ground for those who wish to ascend Mount Arthur without visiting the table-land, as a branch track can be followed up shortly after we leave the saddle leading directly on to the mountain.

The track along Flora Creek in many places presents a most picturesque appearance, the numerous waterfalls and the gradual increase in the size of the stream being features of especial interest. To an entomologist with a tent and plenty of time no doubt a day would be well spent here collecting Neuroptera over the stream, Micro-Lepidoptera, and sugaring the trees at night for moths.

About three miles before we reach the first opening on the table-land the track leaves the bed of Flora Creek, and starts to ascend very rapidly, following the course of a small stream which rises in Salisbury's Opening, near the first hut that is reached. This hut, however, is now quite unfit to stop in, but there are several others in various parts of the table-land that can be used, and are far warmer than a tent, which is not a sufficient protection against the cold at so great an elevation above the sea-level.

Acting on Mr. Meyrick's suggestion, I took a kerosene-lamp with me to the table-land, and lit up at dusk on the first evening (Jan. 22nd). The night was slightly overcast, with a few drops of rain, and much warmer than usual, the result being that several good moths were captured at the lamp, including three specimens of *Leucania propria*, several *Mamestra rubescens*, and a rare *Bombyx*, besides several *Scoparia trivirgata*.

The next day (Jan. 23rd) I decided to ascend Mount Arthur, and left the hut at 7.30, the weather being everything that could be desired. A few minutes' walk brought us to the foot of Gordon's Pyramid, where the track was soon discovered, and followed up until the bush-line is passed at about 4000 ft. I had better, perhaps, mention that this portion of the forest is very rough, and it is most necessary to exercise great care in keeping to the track, which, however, is now well-marked by numerous blazes made during two successive visits. After leaving the forest the vegetation is very rank, consisting of a great variety of alpine plants, tussock, &c. Here, in the hot sunshine, occurred *Harmologa siræa* in great numbers, in the finest condition, flying with much agility, besides large numbers of

Notoreas paradelpha, *Harmologa latomana*, and *Tauroscopa gorgopis*. Two specimens of *Erebia pluto* were taken on a patch of shingle at about 4200 ft., but this must be regarded as an exceptionally low elevation for the species.

On arriving at the top of the Pyramid a long descent is made to reach the Mount Arthur range proper, and it is here that probably the best collecting on the table-land is to be found. *Metacrias erichrysa* was frequently seen dancing about in the hot sunshine, and extremely difficult to catch. Two other Bombyces were also obtained, which are not yet identified; but any moths belonging to the group are of extreme interest, owing to the singular absence of its members from the fauna of the lowlands in New Zealand. High up, at about 4800 ft., *Stathmonyma anceps* was found, the dark grey fore wings harmonising admirably with the rocks on which it perches, besides specimens of *Orocrambus mylites* and *catacaustus*. These insects occurred up to the extreme top of the mountain, as well as *Erebia plecto*, which was very abundant on the shingle-flats above 5000 ft. I must confess that the ascent of the last 800 ft. of the mountain considerably alarmed me, although no doubt the dangers are nothing in the eyes of more experienced climbers.

On the top we discovered the names of previous visitors during the half-hour spent there, and noticed numerous specimens of *Erebia pluto* and *E. orocrambus*, so I am disposed to think that their range of elevation would be considerably more extended on a higher mountain; but, of course, this is a matter for future observation. Above 5000 ft. the only common plant is a fine wiry grass, which I conjecture is the food-plant of these insects. The discovery of the larva of *Erebia pluto* would be of excessive interest, and the insect might probably be reared by anyone who was able to spend two or three months on the table-land, as I think the females would readily lay their eggs in captivity if the young larvæ could not be found. An accurate record of the times of appearance of these alpine insects would also be extremely valuable, which, of course, could only be obtained by a naturalist residing on the table-land during the whole summer.

During the descent numerous stoppages were made to obtain insects, *Erebia pluto* continuing extremely abundant until we left the shingle and snow. Lower down a few Coleoptera were obtained by beating spear-grass blossoms, but the Lepidoptera absorbed most of our attention. It was curious to make the acquaintance here of *Dasyuris partheniata*, a species found on the cliffs above the Hermit's Cave, Wellington, but nowhere, as far as I know, on the sea-level in the Nelson Province. When the top of Gordon's Pyramid was again reached at six o'clock, I was startled to see a conspicuous black insect flying about, which

I felt sure was not *Erebia pluto*. On capturing it I at first took it to be *Erebia butleri*, but subsequent examination proved that it was not a butterfly at all, but *Stathmonyma hectoris*. A rapid descent soon took us through the forest, which appeared extremely beautiful in the evening sunshine, and terminated one of the pleasantest days I have ever spent.*

(To be continued.)

CONTRIBUTIONS TOWARDS A LIST OF THE VARIETIES OF NOCTUÆ OCCURRING IN THE BRITISH ISLANDS.

By J. W. TUTT, F.E.S.

(Continued from vol. xxii., p. 305.)

Apamea, Och., *ophiogramma*, Esp.

The type of this species is represented by Esper's plate 182, fig. 2, 'Die Schmetterlinge,' &c., and may be described as having "The anterior wings yellowish ochreous, with a large, dark-red, somewhat triangular-shaped, costal patch, enclosing the yellowish reniform, and then extending narrowly along the costa to the base; the orbicular obsolete; below this and forming an outline to its lower edge is a yellowish, followed by a slaty, line extending from centre of base to anal angle; below this line the colour is yellow-ochreous, as is also the outer margin to apex; several dark marks on outer margin. Hind wings grey, with greenish tinge." Hübner's figure 355 is "a pale grey-brown ground colour, with a large black costal patch extending from the base, so as to include the dark stigmata; this patch is outlined in whitish; a pale line parallel to hind margin, a dark patch in the middle of the hind margin, and dark forked (>) mark at the anal angle. Hind wings dark grey, with lunule." Haworth describes the species under the name of *biloba* ('Insecta Britannica,' p. 209). His description is:—"Alis griseis fascia abbreviata marginis crassioris subdolabriformi nigra, in qua stigma reniforme griseum."

Apamea, Och., *leucostigma*, Hb.

Hübner twice figured this species,—first under the name of *leucostigma* (fig. 375), and then a very marked variegated variety, of a bright red colour, under the name of *fibrosa* (fig. 385). The latter name has been in general use in Britain for this species. Our specimens are very variable, but all are of a dark umber-brown ground colour. There are two very distinct forms occurring in Britain,—one, variegated with paler transverse basal lines, and a broad pale band extending from the apex to the inner margin, just beyond the anal angle, and extending along the inner

* Abstract from a paper read before the Wellington Philosophical Society, July 10th, 1889.

margin; the median nervures whitish and branching under the reniform, and with either white or ochreous reniform stigmata, = var. *intermedia*;—the other more unicolorous, with the transverse markings comparatively obsolete, the reniform either white (= var. *albipuncta*) or ochreous (= the type). We get nothing in Britain so extreme as Hübner's *fibrosa*; and Guenée, in the 'Noctuelles,' vol. v., p. 210, makes the same remark about the French specimens. He also adds that "specimens are found intermediate between *fibrosa*, Hb., and the unicolorous type." Hübner's type may be described as,—“The anterior wings dark purplish brown, with blackish transverse lines; reniform yellowish. Hind wings purplish grey, with a darker margin.” Mr. Dobrée writes of the Canadian type:—“*Leucostigma*, so far as my specimens permit me to judge, is rather of a bistre- than an umber-brown, and mottled rather than unicolorous” (*in litt.*). Of the type, Dr. Staudinger writes:—“Al. ant. unicolor. nigricant. flavo vel albo-maculatis.” Hübner's type certainly is not “*albo-maculatis*,” but “*flavo-maculatis*.” Mr. Dobrée writes:—“Both forms occur on the Amur, but apparently *fibrosa*, Hb., the less commonly (Graeser, 'Berl. Ent. Zeits.,' 1888). My specimen of *leucostigma* from there agrees with Hübner's type. I have specimens, also from Canada, of both varieties” (*in litt.*). The principal varieties are:—

α. var. *albipuncta*, mihi.—Unicolorous purplish brown (like the type), umber-brown or blackish, with faint traces of transverse markings, but with reniform white instead of ochreous. I have taken this form at Greenwich, and have a long series of it, taken by the Rev. G. H. Raynor in Wicken Fen; and Mr. Percy Russ has captured a considerable number of this variety, with var. *intermedia* and the type, in the neighbourhood of Sligo. Mr. Collins, of Warrington, takes this form a few miles from that town, together with the type and var. *intermedia*. Mr. Reid writes:—“This species is very scarce and local here (Pitcaple, Aberdeen); all those I have taken are referable to var. *albipuncta*. I have not seen any other forms here” (*in litt.*).

β. var. *intermedia*, mihi.—(1) *intermedia-albo*.—Anterior wings of a deep umber-brown, with two pale (slightly ochreous) transverse basal lines, and a paler orbicular; reniform white (sometimes reticulated), and standing on a white geminated line (part of median nervure); a pale oblique transverse streak from apex to inner margin, and a pale wavy line parallel to hind margin. (2) *intermedia-flavo*.—The same as *intermedia-albo*, but reniform ochreous. I have var. *intermedia* from Wicken and Sligo; Mr. Collins also takes this variety in the neighbourhood of Warrington. The Irish specimens are particularly bright, but not red, like Hübner's *fibrosa*.

γ. var. *fibrosa*, Hb.—Hübner's figure 385, *fibrosa*, may be described as, “Anterior wings bright red, with dark greyish outer margin, and darker red around the stigmata; reniform very pale. Hind wings as in *leucostigma*.” This form may occur in Britain, but I have never seen specimens nor heard of any captures at all resembling it. Mr. Dobrée writes:—“The *fibrosa* from Canada are of a more generally sombre colouring, but otherwise similarly marked to the European ones” (*in litt.*).

A SUMMER'S MOTHING ON DARTMOOR.

BY MAJOR JOHN N. STILL.

It seems surprising that so few people know anything of this most lovely and interesting part of the country. Unique in itself Dartmoor possesses very many advantages over other summer resorts: the air has been described as the purest and strongest in England. Its Tors, of which the highest is Yes Tor (2050 ft.), and the immense extent of the moor, give the visitor that sense of freedom which is only felt in mountainous districts.

To the antiquary, naturalist, botanist, and entomologist, Dartmoor will always be interesting, and, as a humble collector of Lepidoptera, I give my experience of collecting, and a list of the captures I made during the past summer on the Moor, at from 700 to 2000 feet above the sea.

During the wet weather which prevailed the latter part of April, 1889, I only took *Xylocampa areola* (*lithoriza*). On the 1st of May I got some specimens of *Lobophora carpinata* (*lobulata*), and, after another spell of wet, *Melanippe galiata*, *Coremia ferrugata*, *C. unidentata*, *C. designata*, and *Rumia luteolata*. During the end of the month *Tephrosia crepuscularia* was numerous in the fir woods, and I took also *Venilia macularia*, *Odontopera bidentata* (abundant), *Tephrosia punctulata*, *Bapta temerata*, and *Hepialus humuli* (abundant). Sugar was of little use, and, although I sugared from April to November almost continually, I found it very unproductive till late in September. I took *Eupithecia lariciata*, *E. subfulvata*, *E. nanata*, *Macaria liturata*, *Adela cuprella*, and *C. viridella*.

When I first came to the neighbourhood my expectations were raised to the utmost by hearing wonderful accounts of the swarms of moths attracted by rhododendron blooms, and of the good collection made in 1888 over the same ground. This year, although we had masses of rhododendrons in bloom, they produced next to nothing. During June honeydew reigned supreme, and literally covered every tree, plant, and shrub. I worked the rhododendrons at and after dusk, and only took the following:—

Xylophasia rurea, *Hadena rectilinea*, *Cucullia umbratica*, *Chærocampa porcellus*, and *Dianthæcia cucubali*. By day, *Eubolia palumbaria*, *Ematurga atomaria*, and *Tanagra atrata* were abundant. I also secured *Thera firmata*, *Cidaria corylata*, *Emmelesia albulata*, *E. unifasciata*, *Melanippe fluctuata*, *Anticlea rubidata*, *Melanthia albicillata*, *Cidaria associata*, *C. dotata*, *Lomaspilis marginata*, *Boarmia repandata*, *Asthena candidata*, *Botys ruralis*, *Angerona prunaria*, *Pseudoterpna pruinata*, *Iodis lactearia*, and the pretty China-mark, *Hydrocampa stagnata*.

The extremely hot weather in June enabled me to use light with advantage, and up to the end of July I captured the following at light:—

Gonoptera libatrix, *Noctua triangulum*, *N. festiva*, *N. baja*, *N. xanthographa*, *N. brunnea*, *Agrotis exclamationis*, *A. porphyrea*, *Axylia putris*, *Hecatera serena*, *Mamestra brassicæ*, *Hadena oleracea*, *H. pisi*, *Leucania conigera*, *L. lithargyria*, *L. pallens*, *L. comma*, *Apamea basilinea*, *A. didyma*, *Mamestra sordida*, *Rusina tenebrosa*, *Spilosoma menthastri*, *S. lubricipeda*, *Dianthæcia capsincola*, *Caradrina quadripuncta*, *C. taraxaci*, *Plusia chrysitis*, *P. gamma*, *P. pulchrina*, *Crocallis elinguaris*, *Grammesia trigrammica*, *Phalera bucephala*, *Habrostola tripartita*, *Calymnia trapezina*, *Arctia caia*, *Smerinthus populi*, *Sphinx ligustri*, *Cidaria suffumata*, *Melanippe unangulata*, *Cleora lichenaria*, *Eucosmia undulata*, *Metrocampa margaritaria*, *Abraxas grossulariata*, and some magnificent specimens of *Geometra papilionaria* and *Elloppia prosapiaria*. Sugar and other means yielded the following :—*Aplecta nebulosa*, *Nemeophila plantaginis*, *Selenia bilunaria*, *Callimorpha dominula*, *Acronycta tridens*, *Halia vaularia*, *Acidalia straminata*, *A. aversata*, *Thyatira batis*, *Hydræcia nictitans*, *Mania typica*, *Miana strigilis*, *Eubolia limitata*, *Pericallia syringaria*, *Uropteryx sambucaria*, *Melanippe sociata*, *Hypsipetes sordidata*, *Emmelesia affinitata*, *Triphæna fimbria*, *T. ianthina*, *T. pronuba*, *T. comes*, *Acronycta rumicis*, and *A. ligustri*.

The wild unsettled weather from the 1st to the middle of August rendered mothing impossible. I took *Gnophos obscurata* by day, and *Polia chi*, which swarmed at sugar. On the 17th I captured one of the best moths I got, viz., *Stilbia anomala*, and afterwards took fourteen specimens, mostly at dusk, flying over long grass; also *Cidaria miata* and *C. siterata*. Light continued to answer until the end of this month, and I secured by its means a fine series of *Neuronia popularis*, *Luperina cespitis*, and *L. testacea*. Also *Noctua neglecta*, *Hydræcia micacea*, *Cilix glaucata*, *Sphinx convolvuli*, *Epione apiciaria*, *Eugonia alniaria*, and the inhabitant of humble-bees' nests, *Aphomia sociella*. August sugaring gave me *Amphipyra tragopogonis*, *A. pyramidea*, *Noctua c-nigrum*, *N. plecta*, *Xanthia fulvago* and *X. flavago*. I took *Pelurga comitata* and *Anaitis plagiata*.

In September I captured *Eugonia quercinaria*. Sugar now seemed to improve; there were many more moths on it, and from this date to the end of October I took at it *Hadena protea*, *Agrotis suffusa*, *A. saucia*, *A. segetum*, *Epunda nigra*, *Xylina socia*, *X. ornithopus*, *Anchocelis lunosa*, *A. pistacina*, *A. rufina*, *Agriopsis aprilina*, *Miselia oxyacanthæ*, *Oporina croceago*, *Scopelosoma satellitia*, and *Calocampa exoleta*.

In conclusion, it cannot be expected that 700 feet above sea-level can be so prolific as lower ground, and no doubt want of knowledge caused me to overlook many species; but I would strongly recommend any entomologist wishing for fine air and scenery, combined with collecting, to try a summer on Dartmoor.

Langstone, Horrabridge, Nov. 12, 1889.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

RHOPALOCERA BRITANNICA.—Messrs. John T. Carrington and F. W. Frohawk intimate that they are about to produce, under this title, a new and carefully prepared monograph of the British butterflies, which will be very fully illustrated by coloured and plain plates, giving life-histories of every species drawn from living ova, larvæ, pupæ and imagines. The authors state that they have already a large amount of material in hand, but invite the assistance of the readers of the 'Entomologist,' by requesting loan of specimens for figuring, and local lists of species with notes. Further particulars are to be duly announced. Communications should be addressed, "JOHN T. CARRINGTON, 'Field' Office, Strand, London, W.C."

COLIAS EDUSA IN 1889.—Additional records of captures are:—

Lancashire.—A good many specimens have been taken in this district during August and September.—G. PODMORE; Charney Hall, Grange-over-Sands, October 25, 1889.

Staffordshire.—Two specimens were noticed at Bar Hill, in the parish of Madeley, by Mr. F. W. Dutton, of Newcastle-under-Lyme, when out partridge-shooting in September. Mr. Dutton was formerly a collector, and he therefore could not be mistaken.—(Rev.) THOS. W. DALTRY; Madeley Vicarage, Staffs.

Shropshire.—On the occasion of an excursion of the North Staffordshire Naturalists' Field Club and Archæological Society to Hawkstone, Lord Hill's seat in Salop,—on Sept. 12th, I saw a male specimen of *C. edusa*, caught by a young man who was out with the Club, in the park at Hawkstone.—(Rev.) THOS. W. DALTRY; Madeley Vicarage, Staffs.

Hants.—Last season *Colias edusa* was fairly numerous at Gosport, Mr. Laron meeting with eight one day at Hillhead, and others were reported, —also seen by myself,—from Stokes Bay and other places on the Solent.—W. T. PEARCE; 111, High Street, Gosport.

Devonshire.—During the second week in August my father took five males and one female of this species, on a railway-bank at Dawlish, and saw several others.—C. NICHOLSON; 202, Evering Road, Upper Clapton, London, N.E.

EPINEPHELE TITHONUS VAR.—In August I caught eight specimens of *E. tithonus*, seven females and one male, each having two additional eye-spots on the upper wings. They are all more or less injured (*vide* Entom. xxii. 306). I think they must be sought for earlier in the season.—M. CRASKE; Newacott, Bridgerule, Holsworthy, Devon, December 7, 1889.

ACHERONTIA ATROPOS IN 1889.—The following records of the occurrence of *Acherontia atropos* during last year, have been received:—

Yorkshire.—At the close of the month of August, we met with a batch of the larvæ of the death's-head moth at Hornsea. They were feeding on the so-called "tea-tree" (*Lycium barbarum*), one of the Solanacææ. We got a dozen that were nearly full-fed. These were placed, with their food-plant, under a garden bell-glass, where they continued to feed for a week on the leaves of the tea-tree, the branches of which they soon stripped of their foliage. Another change, and they gradually began to make their way into the soil, burrowing down several inches, and forming an earthen

case wherein to pupate. The case, I may remark, was made up of minute granules of earth and sand, with a few tiny stones intermixed; but I could find no flossy material, even under a strong lens. Herein they remained, apparently quiescent, till the 7th of November, when the first moth emerged from its pupal garments, and in half an hour, or a little more, the wings were fairly expanded, and assumed their full proportions. Every other afternoon the moths have put in an appearance, till the number has nearly equalled the number we originally got. Among the batch are only three cripples, and one pupa that is lively but has not yet emerged. Of the dozen caterpillars, seven were brownish olive, with the anterior segments, as Stainton remarks, white, the white being well defined and conspicuous. I must leave it to students of colour-varieties to tell us how such discrepancies arise. Food cannot be the cause, since all fed alike. Again, some moths have the skull-like mark on the thorax white, and some dusky. Kaltenbach tells us that the larva on the Continent feeds on the potato, thornapple, jasmine and mock-orange (*Philadelphus*). Prof. Hessner has noticed several caterpillars feeding on the trumpet-flower (*Catalpa*).—PETER INCHBALD; Hornsea, Holderness, November 20, 1889.

Cheshire.—A full-fed larva was sent in here on the 7th of September last; it was taken in a potato-field near Frodsham, and I have a second record from Manley, a neighbouring village near Delamere Forest.—R. NEWSTEAD; Curator, Grosvenor Museum, Chester.

Norfolk.—In September last larvæ were very common at Ingoldisthorpe and the surrounding district.—R. NEWSTEAD; Curator, Grosvenor Museum, Chester, October 17, 1889.

Sussex.—On August 6th I had brought to me two full-fed larvæ of *Acherontia atropos*. They were found in a potato-field at Pevensey Sluice, about three miles from here. I put them into a box partly filled with earth, and the next day they had both buried themselves. There were several others found in the same locality, but these were destroyed.—THOMAS HOWE; 3, Royal Terrace, Devonshire Road, Bexhill-on-Sea, November 10, 1889.

Hants.—The autumn of 1885 was in the Portsmouth district, as in many other parts of the country, remarkable for the number of specimens of *Acherontia atropos*, which were taken in all stages. Three imagines were found in the grounds of the Free Library; upwards of 170 larvæ and pupæ were obtained by Mr. R. Stent, from the Portsmouth potato-diggers; and more than 50 larvæ and pupæ were obtained by myself, from the diggers at Gosport. Of the pupæ which I obtained I tried to force 14, by keeping them in damp sawdust in a biscuit tin, on a very warm shelf in the shop. By Christmas 10 imagines had emerged, but the sides of the tin being too smooth, they could not crawl up, and falling on their backs, in their struggles to recover they tore their wings with their sharp claws, so that I only obtained three perfect specimens. Mr. Stent was not so successful with those he experimented upon. From October, 1885, until August of the present year, the insect disappeared altogether. At the end of last August, two full-fed larvæ were brought to me at Gosport. These I at once placed in a tin as before, but took the precaution to line the sides with thin rough wood. Early in September a pupa was brought to me by a potato-digger, and placed with the others. I was not able to obtain any more. A male emerged on October 21st, a fine female on October 22nd, and another female on November 17th; all three in perfect condition, and

their stridulating powers well developed.—W. T. PEARCE; 111, High Street, Gosport, November 20, 1889.

Isle of Wight.—*Acherontia atropos* was by no means uncommon here in September, when larvæ and pupæ were found singly scattered over a considerable area.—ALBERT J. HODGES.

Dorsetshire.—On 10th August last, I received by post a larva of *Acherontia atropos*, which was found feeding on vegetable-marrow in a nursery-garden at Blandford. It immediately pupated, and the perfect insect emerged and fully expanded on 18th October.—C. B. SMITH; 58, Rectory Road, Stoke Newington, N.

SPHINX CONVULVULI IN 1889.—The following additional records have been received:—

Co. Cork.—This Sphinx-moth was very common at Glandore this autumn, previously the capture of two or three only having come under my notice. I saw and captured about eighteen, all visiting the flowers of *Nicotiana affinis*. Every favourable evening in September a couple of these fine moths flew over the favoured plants, making a loud buzzing sound in their quick flight. — C. DONOVAN; Westview, Glandore, October 23, 1889.

Lancashire.—I took four *S. convolvuli* this year, on a patch of *Nicotiana affinis* in my garden, the dates being Augt. 24th, 29th, Sept. 8th, 13th.—G. PODMORE; Charney, Hall, Grange-over-Sands, October 25, 1889.

Isle of Wight.—I can add two captures of *S. convolvuli* to your list, which specimens came to petunia bloom on Sept. 11th and 12th last.—ALBERT J. HODGES.

DEILEPHILA EUPHORBIAE.—This very rare insect in Britain has this year re-appeared. A young friend, this autumn, came upon thirteen nearly full-fed larvæ, feeding upon *Euphorbia paralis*. They all very shortly after capture pupated, though three of them died in the process. The remaining ten are at the present moment healthy pupæ in my possession. I believe it is now many years ago since the larvæ of *D. euphorbiae* were last taken in this country. The above are British beyond all doubt.—(Rev.) J. SEYMOUR ST. JOHN; 42, Castlewood Road, Stamford Hill, N., November 22, 1889.

SMERINTHUS POPULI, RAPID DEVELOPMENT OF.—It may be of interest to note that a young friend of mine, living near London, has bred several specimens of the above in August last, from ova laid two months before.—J. M. ADYE; November 20th, 1889.—I found a full-fed larva of *S. populi* at Southsea, on July 14th, which pupated and appeared as a moth on the 14th August.—W. T. PEARCE; 111, High Street, Gosport.

SMERINTHUS TILIÆ: MALES ASSEMBLING.—Last year, I again, in Surrey, took about a dozen *S. tiliæ*, assembling round a captive female.—HARRY M. SEE; 4, St. Paul's Close, Walsall.

PARASITES OF BOMBYX RUBI.—When preserving some of the larvæ of *Bombyx rubi*, I came to an unusually fine specimen and which to all appearance looked as healthy as the others. Upon emptying it I found that it was completely filled with nearly full-grown ichneumon larvæ. These I found, upon preserving them in spirits, to number fifty-six. This, I think, is an exceedingly high number to be enclosed in one larva.—A. LIONEL CLARKE; Barton, Gloucester.

EPIONE PARALLELARIA VAR.—Whilst collecting Lepidoptera early in July, 1889, a short distance from York, I had the good fortune to take the very rare variety of the extremely local *E. parallelaria* (*vespertaria*), along with several type specimens. The variety is of a dark uniform brick-red colour, and has the usual dark border.—WILLIAM HEWETT; 3, Wilton Terrace, Fulford Road, York, October 20, 1889. [This variety is more commonly bred than captured; some years not unfrequently.—ED.]

METROCAMPA MARGARITARIA VAR.—On July 29th, 1889, I bred a beautiful variety of this elegant species, with all the cilia pale red, which seems to be a continuation of the red streak at the apex of the fore wings. The cilia thus coloured adds much to the beauty of the insect.—R. NEWSTEAD; Grosvenor Museum, Chester.

ODONTOPERA BIDENTATA VAR.—I took a fine variety of *O. bidentata* on the 18th May last, which is perfectly black all over.—HARRY M. SEE; 4, St. Paul's Close, Walsall.

IRREGULAR EMERGENCE OF LEPIDOPTERA.—I obtained some ova of *Nemeophila russula* in 1889, which hatched in due course. Two of the larvæ fed up rapidly, pupated, and became perfect insects on the 2nd September. The remainder are now about half grown, and are behaving as might be expected from them. Broods of *Melanthia ocellata* and *Euplexia lucipara* have acted in a similar manner; and of two pupæ of *Notodonta ziczac*, one has already emerged, but not the other.—C. NICHOLSON; 202, Evering Road, Upper Clapton, N.E.

COLORADO ENTOMOLOGY.—In Entom. xxi., pp. 298—305, I gave an account of some entomological explorations in Eastern Custer Co., and S.W. Pueblo Co., Colorado, enumerating the species taken, so far as then identified. In Entom. xxii. I added three Hymenoptera to the list. Since then I have obtained the names of various other species taken, which I quote below, as a further contribution to the fauna of this interesting region. For identifications I am indebted to Prof. A. S. Packard, Dr. G. H. Horn, Dr. John Hamilton, Lord Walsingham, and Mr. W. H. Edwards. (1.) E. Custer Co.:—*Saprinus sphaeroides*, Lec., *Coccinella 9-notata*, Hbst., *Epuræa papagona*, *Listrus senilis*, Lec., *Desmaris constrictus*, *Smicronyx fulvus*, *Papilio asterias*, Fab., *Pyrgus tessellata*, Scudd., *Pamphila nevada*, Scudd. (2.) S.W. Pueblo Co.:—*Dendroctonus terebrans*, *Amara fallax*, Lec., *Badister obtusus*, *Diplotaxis heydeni*, *Serica curvata*, Lec., *Diabrotica atripennis*, *Ditylus obscurus*, *Tomicus pini*, Say, *Tachyporus jocosus*, Say, *Crocota brevicornis*, Walker, *Tolyte*, n. sp., *Pædisca dorsisignatana*, Clem., *Psecadia dicostrigella*, Cham., *Epyris monticola*, Ashm., n. sp.—T. D. A. COCKERELL; West Cliff, Custer Co., Colorado, October 19, 1889.

NOTES FROM NEW ZEALAND.—We have again been favoured with an unusually fine winter in New Zealand, as the following notes on insects observed during August and September will sufficiently show, seeing that these two months are the equivalents of February and March in Europe. On July 31st my brother saw the first hybernated specimen of *Vanessa gonerilla*, and on Aug. 13th they were very abundant in the Botanical Gardens, as well as *Ichneumon mediator* and several Diptera. On Aug. 21st I found a large number of the full-grown larvæ of *Nyctemera annulata* on the New Zealand groundsel (*Senecio bellidioides*), but saw no perfect insects. I also

opened a nest of *Formica zealandica*, which contained large numbers of winged males and females, so that I conclude this species takes its conjugal flight in the spring, whilst that of *Atta antarctica* occurs in the autumn. On August 29th and 31st I was engaged in collecting Coleoptera, and, besides taking several of the *Pselaphidæ*, succeeded in obtaining four or five specimens of *Otiorhynchus sulcatus*, a somewhat uncommon species in New Zealand. September has been a warm wet month. The commonest species of Lepidoptera was *Pasiphila bilineolata*?, of which I managed to obtain a good series, and hope, with the assistance of Mr. Meyrick, to be able at last to rescue that unfortunate insect from the chaotic condition in which it has so long been involved. Sept. 22nd was a lovely spring day, and on visiting an old locality, where I have collected at least weekly for upwards of seven years, I was astonished to meet with *Vanessa otea*, a species hitherto only recorded from localities as far north as Napier and New Plymouth. I also saw many hibernated specimens of *Vanessa cardui*, so it appears likely that we are again to be favoured with this interesting species in unusual numbers. I should also mention that during the last week in September, a young friend of mine captured two male specimens of *Charagia virescens* at a shop window in Palmerston North, attracted by the light. It will therefore, perhaps, be necessary to somewhat modify the statement in my former paper as to the rarity of that species in the imago state (Entom. Feb. 1885). In one of these specimens the white spots on the forewings are slightly larger than usual, almost forming a continuous band from the costa to the inner margin of the wing. The other is typical.—G. V. HUDSON; Wellington, New Zealand, October 3, 1889.

HYDRADEPHAGA NEAR LONDON. — My search for aquatic beetles in a pond near Tottenham during the present month, resulted in the capture of nineteen specimens of *Hydrophilus piceus*, sixteen of which were perfect. The elytra of one were somewhat deformed, so I returned it to its haunts. *Dytiscus marginalis* was also very plentiful there. The pond was large and deep, but the beetles were amongst the weeds near the surface and about three or four feet from the edge of the pond. Near Stamford Hill, about the same time, I also got *Dytiscus circumflexus* (2), *D. punctulatus*, and *Hydrous caraboides*. With *H. piceus* were also four nice specimens of *Ranatra linearis*.—F. MILTON; 164, Stamford Hill, N., Nov. 20.

NEW VIEWS ON THE SUBORDER HOMOPTERA. — Burmeister says truly, "a system can only separate and connect where Nature itself has marked separation and connection." I will not involve myself in a discussion as to the sharp and *natural* distinctions between suborders and families. As Mr. Distant (Entom. xxii. 360) seems to be clear in his mind on this point, I, in company with others, should value his definitions, or those, indeed, of any one competent to give them. Species, for practical purposes, are *natural* facts. Families are inferences from facts, which is a very different thing. I now gather that "les Cigalles Muettes," of Latreille, including the Fulgorinæ, Cercopinæ, Jassinæ, &c., are neither Cicadæ nor Cicadidæ, but that they range as equally distinct groups with Aphis, Coccus, and Psylla. But I suggest that the authorities of great names (the pioneers of Zoology) are not to be dismissed simply because they seem to be not "modern." My critic "knows no silent Cicadidæ." However, under one or more of the following terms,—Cicadæ, Cicadariæ, Cicadidæ, Cicadinæ, Cicadellidæ, Cicadinen, and Cicadelles,—Les Muettes are

grouped by Linnæus, Fabricius, Schrank, Germar, Burmeister, Fallen, Kirschbaum, Sahlberg, Fieber, Walker, Edwards, and Scudder. The author of this note finds himself in good company as to the choice of a title to his forthcoming illustrations of this group of insects. Dr. F. Xavier Fieber published his 'Katalog. d. Europæischen Cicadinen' (embracing the Fulgoridæ, &c.) in 1872. The posthumous papers of this "grand hémiptériste" were edited by M. Reiber, assisted by Messrs. Puton and Lethierry, in 1875. Dr. Stal dedicated his fourth volume of 'Hémiptères' to his friend Dr. Fieber in 1866. I fail to see why the author of 1875 is to be dismissed as an authority on European Cicadinæ, as being the least modern of the two. A friend proposes the names Stridulantes and Siléntes, instead of the neuter names Stridulantia and Siléntia, as inserted in my sketch-plan; they seem to be better.—G. B. BUCKTON.

MORE NOTES FROM THE NEW FOREST.—I can corroborate Mr. Blaber's remarks (Entom. 261), as to the general scarcity of Lepidoptera, and the complete failure of "sugar" at Lyndhurst in 1889. I went there on the 25th June and stayed till the 10th July. The first ten days were all that could be desired as far as the weather was concerned, but after that rain set in, and, I believe, continued intermittently till the middle of August. Of Diurni, *Lycæna ægon* was common and in splendid condition, but, as usual, rather local. Of *L. icarus* I did not see a single specimen, and only one *Thecla quercus*. My experience, however, does not coincide with Mr. Blaber's as regards *Argynnis paphia*. I only saw a few males at first, but both sexes became very abundant towards the end of my stay. Of the variety *valesina* I saw two, one of which I took. I hear they have been rather common there this season. *A. adippe* was fairly common, but I only took one *aglaia*. *Limenitis sibylla* was by no means scarce, as I frequently saw two or three at once. The Pieridæ were conspicuous by their almost total absence. *Epinephele ianira* and *E. hyperanthes* were extremely abundant, as usual. *E. tithonus* and *Hesperia thaumas (linea)* were just coming out, though *H. sylvanus* was common. I was too early for *Vanessa io*, *V. atalanta*, *Pararge megæra*, and *Gonopteryx rhamni*, though a few hybernated specimens of the latter were still to be seen. Of *Melanargia galatea* I took five specimens in an enclosure near the station. Of moths, *Nemeophila russula* was not uncommon on the heaths; but night-flying moths were remarkably scarce, especially Noctuæ. *Larentia pectinitaria*, *Melanippe montanata*, and *Acidalia remutata*, seemed to be the principal things, and *Tortrix viridana* was a perfect pest, when flying, from its knack of looking like any other insect but itself. I noticed that the trees did not present such a miserable appearance as they did last year, which was, perhaps, on account of the comparative scarcity of larvæ.—G. NICHOLSON; 202, Evering Road, Upper Clapton, N.E.

ERRATUM.—Entom. December, 1889, in Mr. Bignell's communication, page 306, lines 5 and 7 from foot, for *Trogus exaltorius* read *T. exaltatorius*.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON. — December 4th, 1889. — The Right Hon. Lord Walsingham, M.A., F.R.S., President, in the chair. Prof. Franz Klapálek, of the Zoological Department, Royal Museum, Prague, was elected a Fellow of the Society. Mr. W. L. Distant

exhibited, on behalf of Mr. Lionel de Nicéville, a branch of a walnut tree, on which was a mass of eggs laid by a butterfly belonging to the *Lycænidæ*. He also exhibited two specimens of this butterfly which Mr. de Nicéville had referred to a new genus and described as *Chatoprocta odata*. The species was said to occur only in the mountainous districts of North-West India, at elevations of 5000 to 10,000 feet above the sea-level. Dr. D. Sharp exhibited the eggs of *Piezosternum subulatum*, Thunb., a bug from South America. These eggs were taken from the interior of a specimen which had been allowed to putrefy before being mounted. Although the body of the parent had completely rotted away, the eggs were in a perfect state of preservation, and the cellular condition of the yelk was very conspicuous. Dr. Sharp also exhibited a specimen of *Pæcilochroma lewisii*, Dist., a Pentatomid bug from Japan of a dull green colour, which when damped with water becomes almost instantly of a metallic copper colour. Mr. J. H. Leech exhibited a large number of Lepidoptera recently collected for him by Mr. Pratt in the neighbourhood of Ichang, Central China. The collection included about fifty-four new species of butterflies and thirty-five new species of moths. Capt. Elwes observed that he noticed only two genera in this collection which did not occur at Sikkim, and that the similarity of the insect fauna of the two regions was very remarkable. He added that about fifteen years ago, in a paper "On the Birds of Asia," he had called attention to the similarity of species inhabiting the mountain ranges of India, China, and Java. Mr. M'Lachlan remarked that he had lately received a species of dragonfly from Simla which had previously only been recorded from Pekin. Mr. Distant said he had lately had a species of *Cicada* from Hongkong, which had hitherto been supposed to be confined to Java. Mr. W. H. B. Fletcher exhibited a preserved specimen of a variety of the larva of *Sphinx ligustri*, taken in a wood near Arundel, Sussex. Mr. W. White asked if the larva was normal in its early stage; he also exhibited drawings of the larvæ of this species, and called especial attention to one of a variety that had been exhibited at a previous meeting by Lord Walsingham. Mr. F. D. Godman read a long letter from Mr. Herbert Smith, containing an account of the Hymenoptera, Diptera, Hemiptera, and Coleoptera he had recently collected in St. Vincent, where he was employed under the direction of a Committee of the Royal Society, appointed to investigate the Natural History of the West Indies. A discussion followed, in which Dr. Sharp, Capt. Elwes, Lord Walsingham, and Mr. M'Lachlan took part. Capt. Elwes read a letter from Mr. Doherty, in which the writer described his experiences in collecting insects in the Naga Hills by means of light and sugar. Mr. Doherty expressed an opinion that light, if used in very out-of-the-way places, rather repelled than attracted insects; in fact that they required to be accustomed to it, and that the same remarks applied to "sugar." Colonel Swinhoe said that the attractive power of light depended very much on its intensity, and on the height of the light above the ground. By means of the electric light in Bombay he had collected more than 300 specimens of Sphingidæ in one night. Mr. J. J. Walker, R.N., stated that he had found the electric light very attractive to insects in Panama. Mr. M'Lachlan, Dr. Sharp, Mr. Leech, Capt. Elwes, the Rev. Canon Fowler, Mr. A. J. Rose, and others continued the discussion. Mr. Lionel de Nicéville communicated a paper entitled "Notes on a new genus of *Lycænidæ*." Mr. F. Merrifield read a paper entitled "Systematic temperature experiments on some

Lepidoptera in all their stages," and exhibited a number of specimens in illustration. The author stated that the darkness of colour and the markings in *Ennomos autumnaria* resulted from the pupæ being subjected to a very low temperature. In the case of *Selenia illustraria*, exposing the pupæ to a low temperature had not only affected the colour of the imagos, but had altered the markings in a striking manner. Lord Walsingham observed that it appeared that exposure to cold in the pupa-state produced a darker colour in the imago, and that forcing in that stage had an opposite effect; that insects subjected to glacial conditions probably derived some advantage from the development of dark or suffused colouring, and that this advantage was, in all probability, the more rapid absorption of heat. He said he believed that an hereditary tendency in favour of the darker forms was established under glacial conditions, and that this would account for the prevalence of melanic forms in northern latitudes and at high elevations. Capt. Elwes, Mr. Jenner Weir, Dr. Sharp, and others continued the discussion.—H. GOSS, & W. W. FOWLER, *Hon. Secs.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—November 14th, 1889.—T. R. Billups, F.E.S., President, in the chair. Messrs. E. H. R. Hillsworth, of Forest Gate; T. Hudson, of Battersea; M. Farrant, of Pimlico; and J. A. Revell, of Stoke Newington, were elected Members. Mr. Jäger exhibited *Dianthæcia irregularis*, *Agrophila trabealis*, and *Neuria reticulata*, from near Brandon, Suffolk; also *Agrotis ripæ*, bred from larvæ taken in S. Wales; and read notes with reference to rearing this species. He said the larvæ required about three feet of sand in which to hybernate, although they pupated just below the surface. He had not found the larvæ cannibals, although they were frequently stated to be so. Mr. Tugwell, strongly divergent forms of *Agrotis tritici* and *A. cursoria*, from English, Irish and Scotch localities. Mr. Adye, varieties of *Anchocelis lunosa* taken at Christchurch. Mr. Wellman, a specimen of *Nemeophila plantaginis* var. *hospita*, taken in Yorkshire, 1860. Mr. Tutt, a drawer of *Gnophos obscuraria* from many localities, arranged to show its range of variation. Mr. R. Adkin, *Gnophos obscuraria* from Folkestone, Eastbourne, and Lewes; and long and varied series of *Acidalia marginipunctata* from Eastbourne; on behalf of Mr. W. J. Austin, extreme forms of *Gnophos obscuraria*, *Angeronia prunaria*; females of *Lycæna icarus* shot with blue, and a male of pale lilac colour; and a variety of *Argynnis aglaia* having the wings semi-transparent. Mr. Adkin also exhibited, on behalf of Mrs. Hutchinson, a species of *Scoparia*, probably *mercurella*. Mr. Carrington, *Eupithecia extensaria*. Mr. McLachlan, varieties of *Lycenidæ*, one of which he thought might be an hermaphrodite specimen of *L. icarus*. Mr. Carpenter, *Hepialus virensis*, attacked by the fungus *Cordiceps Robertsii*, from New Zealand, which gave rise to a discussion as to how the germs of the fungus were received by the larva.

November 28th, 1889.—The President in the chair. Messrs. M. Cameron; L. H. Strong, of Hackney; C. G. Barrett, F.E.S., of King's Lynn; F. P. Trewicke; A. J. Robertson; A. V. Legros, of Hammer-smith; L. W. Harris, of Forest Hill; C. H. Lemmon, of Rotherhithe; W. Howgrave, of Blackheath; and W. E. Nicholson, of Lewes, were elected members. Mr. Jenner Weir exhibited specimens of *Limnas*

chrysippus and *Hypolimnas misippus*, received from Dr. Percy Rendall from the Gambia; also *L. dorippus* from Eastern Africa, and a female mimic of *H. misippus*; *L. chrysippus*, from Ceylon, and its mimic *H. misippus*; *L. chrysippus*, from Natal, with a white spot on the under wings similar to that of the intermediate female of *H. misippus*, referred to above; and, lastly, a female of *H. misippus*, which appeared to mimic a species of *Limnas* intermediate in colour between *L. dorippus* and *L. chrysippus*, and said it would therefore appear that where these two species of *Limnas* were found together and hybridised, the mimicking female of the *Hypolimnas* was found similar in colour to the hybrid. Mr. Fenn, a long series of *Hybernia aurantiaria* from N. Kent. Mr. Elisha, bred specimens of *Deilephila galii* bred from pupæ forced during March, at a temperature of from sixty to seventy degrees, emerging from fourteen or sixteen days after being placed in this heat, and he had not lost any pupæ during this process. Mr. Billups read a paper contributed by the Rev. W. F. Johnson, "A Further List of the Irish Staphylinidæ, compiled in 1889." The Secretary read two contributions from Mr. T. D. A. Cockerell, "Hybrids and Mongrels," and "Do the Colours of Living Insects fade?"—H. W. BARKER, *Hon. Sec.*

REVIEWS.

Proceedings of the Dorset Natural History and Antiquarian Field Club.
Dorchester: 'Dorset County Chronicle' Office. Vols. ix. and x.
1888—89. Price Seven and Sixpence each.

WHEN one turns over the pages of these handsomely produced volumes, one feels regret that among all the varied societies there is none for the collation and indexing of all the proceedings or transactions of the various local and metropolitan scientific clubs or societies. To a private individual it seems almost impossible to find what papers, bearing upon any particular subject, have thus been overlooked. Here is an example,—a society not nearly sufficiently known, doing excellent work in Entomology and otherwise, publishing papers with coloured and plain plates of the greatest use to the systematic entomologist. In these two volumes we may particularly refer to (in vol. ix.), "*Batalis siccella*, a moth new to Britain"; (in vol. x.), "New and Rare British Spiders," "A New Species of *Epischmia*," "Supplement to the Lepidoptera of the Isle of Purbeck," and others. Entomologists will not begrudge the expenditure necessary in obtaining these Proceedings.—J. T. C.

The Butterfly, its Life-history and Attributes. By JOHN STUDLAND.
London: T. Fisher Unwin. 1889. Price One Shilling.

ANYTHING which draws attention to Entomology and so begets students in that subject should be welcomed, no matter how elementary be the work. This is evidently the object of the little work under consideration. It is a pity, however, that in choosing blocks for illustration more accuracy of delineation was not observed, for if a beginner has to learn a thing, it is just as well to do so once for all, and not have to relearn his lesson at a later period. It will be a useful little book for those who know nothing of Entomology.—J. T. C.

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EDITORIAL NOTICE.

It is with great pleasure I have to announce that the Reference Committee of the 'Entomologist' will henceforth be increased and strengthened by the addition thereto of Mr. WM. LUCAS DISTANT, F.E.S., &c.; Mr. MARTIN JACOBY, F.E.S.; Mr. JOHN HENRY LEECH, B.A., F.L.S., F.E.S., &c.; Dr. DAVID SHARP, F.Z.S., F.E.S., &c.; Mr. G. H. VERRALL, F.E.S.; and Mr. W. WARREN, M.A., F.E.S. All these gentlemen are so well known as authorities in their particular fields of biological research that it is unnecessary for me to say another word on introducing them to the readers of the 'Entomologist.' As Editor, however, of this magazine, I desire to tender them my very sincere thanks for so kindly according me their valuable aid.

In discharging the duties of my new position it is a deeply-felt gratification to me to know that I retain the confidence and shall have the esteemed assistance of my former colleagues, Messrs. BILLUPS, FITCH, JENNER WEIR, and Dr. BUCHANAN WHITE. I take this occasion to express my gratitude to these gentlemen for their support.

As regards the programme of the 'Entomologist,' it is not proposed to depart very materially from the lines upon which this magazine has so far been successfully conducted. As hitherto, papers, notes, &c., dealing with the insect-fauna of the British Islands will be primarily considered; but to be in touch with the requirements of a not inconsiderable section of British entomologists, articles, by English and foreign authors, on insects of all Orders, from various parts of the world, will appear more frequently. Additional pages will be given when lengthy faunistic papers are published.

RICHARD SOUTH.

NEW SPECIES OF LEPIDOPTERA FROM CHINA.

By J. H. LEECH, B.A., F.Z.S., &c.

THE following are the descriptions of some of the more important of the new species captured by Mr. Pratt, who collected for me in the neighbourhood of Ichang, Central China, during the season of 1888. I regret that I am unable to figure them at present, but I hope to do so before long; and, in the meantime, I can only say that I shall always be most happy to show the types to anyone who takes an interest in the fauna of China.

ZETHERA SAGITTA, sp. n.

Creamy white; neuration, apex, and margins of primaries black; some black scales along the upper portion of discoidal cell, which is partially divided by a black bar across its centre, a black wavy submarginal band extending to the second median branch, and a zigzag black line before the outer margin: secondaries have the submedian and median nerve and branch broadly black, but the other nerves are only narrow, a black zigzag line on the outer margin forms a series of arrow-heads, of which the veins represent the shafts. On the under surface the colour is rather more yellow, and the venation, except median and branches, narrowly blackish, the lines of the upper surface only faintly reproduced. Expanse, 78—90 mm.

Several specimens, including one example of the female, from Chang Yang, taken in June.

This species is allied to *Z. hestioides*, Feld., from the Philippines.

MELANARGIA HALIMEDE.

Arge halimede, Mén. Bull. de l'Acad. xvii. p. 216; Schrenck's Reisen, p. 37, t. iii., fig. 6 ♂, 7 ♀.

Melanargia halimede, var. *meridionalis*, Feld. Wein. Ent. Mon. vi. p. 29 (1862); Leech, Trans. Ent. Soc., 1889, p. 101.

Melanargia halimede, Elwes, Proc. Zool. Soc., 1881, p. 903; Leech, l. c., 1887, p. 425.

An extensive series from Chang Yang, taken in July.

The majority of the specimens are more or less of the typical form of the species; some of the examples agree with the specimens figured by Ménétriés; others have the well-defined black bands on the upper, and ocelli on the under, surfaces, noticed by him. None of the specimens are, however, as dark as the palest example from Japan.

One form, of which there are several examples, is so very conspicuous that I have ventured to describe and give it a varietal name.

Var. MONTANA.—Central band very narrow, and the outer border is only faintly indicated, whilst on the secondaries the black markings are absent, excepting slight traces of a ring in the first median interspace, and a slender dentate submarginal line.

LEPHE OCCULTA, sp. n.

Allied to *M. oculatissima*, Pouj. (Ann. Ent. Soc. Fr., 1885, p. xxiv.), but much darker brown, the spot at inner angle of primaries is without white

pupil, and of the same size as that at apex. On the under surface of primaries there are but four ocelli, and the second and third of these are very indistinctly formed: on the secondaries there are six ocellus-like spots, but the third and fourth are very shadowy; basal two-thirds of primaries brown, apical third and whole of secondaries pale olive brown, all the wings sprinkled with ochreous scales and traversed by dark brown lines. Expanse, 65 mm.

One male example, taken in July, at Chang Yang.

I have not seen the type of *M. occulatissima*, Pouj.; the comparison is with the original description and with named specimens in Mr. Oberthür's collection.

LETHE CYRENE, sp. n.

Brown, tinged with ochreous; apical third of primaries slightly paler, divided off obliquely from just beyond the middle of costa to near inner angle, and containing a series of four small blackish spots, each placed at the interior end of a narrow longitudinal fold on the outer margin, an indistinct dark line parallel with outer margin. Secondaries with five black spots set in fulvous rings, the costal one of the series has a large white pupil, and the third is least in size, a small chestnut patch at anal angle; fringes white, chequered with brown, and preceded by a double line, following the contour of outer margin. Under surface ochreous brown; two short transverse brown bars intersect the discoidal cell, the space between them is pale ochreous, and the outer bar is continued below the median nervure to the inner margin; beyond the cell is a broad brown band, which traverses the wing in an oblique direction to the first median branch, below which it turns inwards and then outwards to the inner margin, this band is bordered externally with pale ochreous; a submarginal series of five small ocelli set in a transverse patch of pale ochreous is followed by two brown lines parallel with the outer margin, the interspace filled up with pale ochreous from opposite the first ocellus to inner angle; fringes grey, with a dark line at their base. Secondaries traversed by a pale ochreous stripe bordered with brown; this stripe does not attain the inner margin, and the outer edge bulges about the middle; towards the outer margin is a series of six ocelli set in a broad transverse patch of pale ochreous, the first ocellus near the costa is the largest, but does not greatly exceed the fourth and fifth, all have elongated white pupils and the sixth is double; a brown line, preceded by a whitish one, and followed by one of pale ochreous parallel with outer margin; fringes as above.

♀. Apical third of primaries paler than in the male, with a whitish costal dot on its inner edge, outer margin of secondaries more angulated; the under surface is pale brown, central third of primaries darker, enclosing a whitish bar which crosses the discoidal cell; secondaries with the costal mark of the male outlined in and partly filled up with brown. Expanse, 62—68 mm.

Five male and one female specimens, taken in June, at Chang Yang.

Allied to *L. syrcis*, Hew.

LETHE TRIMACULA, sp. n.

♂. Fuscous brown; apical third of primaries slightly paler, and enclosing a distinct ocellus. Secondaries with two ocelli near anal angle, the upper one with white pupil faint or entirely absent. Under surface of primaries grey-brown, apical third greyish clouded with pale brown, and divided off by a dark brown curved slightly wavy band; the discoidal cell is closed by a dark brown line, and divided transversely by another line of the same colour; ocellus very distinct; a dark brown line parallel with outer

margin is preceded by a zigzag one, and followed by one at the base of the pale grey fringes. Secondaries greyish, with five well-formed ocelli, that on the costa is very large and bipupilated, as also is the smaller one at anal angle; two brown lines traverse the disc, the outer curves half round the costal ocellus, and then proceeds in a series of waves to the inner margin; fringes and marginal lines as on primaries. The ocelli on both surfaces are ringed with pale fuscous. Expanse, 68—72 mm.

♀. Same as male, but apical third of primaries limited by a pale band.

Several males and one female from Chang Yang, taken in July.

LETHE NIGRIFASCIA, sp. n.

♂. Fuscous brown, darker on the outer margins. Primaries crossed by a black band which curves from the costa, and is not well defined until it reaches the third median branch, where it is dilated, as it also is at each succeeding vein to the inner margin. Secondaries have a submarginal series of six black spots set in pale rings, the first is largest, but does not greatly exceed the fourth, whilst the sixth is smaller and indistinct; a pale line parallel with outer margin. Fringes white, fuliginous at extremities of the nervules. Under surface ochreous brown, fuscous towards outer margin; a broad whitish bar crosses the discoidal cell; central transverse line whitish, ill defined, commencing as a blotch on costa, and bordering a faint reproduction of the black band of upper surface; a smaller white patch nearer the apex, and a pale line parallel with outer margin. Secondaries have two pale violet basal lines, the first is indistinct after passing the median nervure, but the second continues its course to the submedian, where it turns in and terminates at the internal nervure; beyond is another pale violet line, bordered inwardly with brown, running from costa to first median branch, where it turns sharply inwards and upwards for a short distance, then again turns and descends to the median nervure; a fourth pale violet line traverses the wing in a wavy course from costa to inner margin; this is bordered externally with various shades of brown and limits the outer third, which is somewhat darker than the rest of the wing, and has a series of six ocelli; the first four of these ocelli are surrounded with pale violet, but in the two last, which are larger, this colour is only distinct on their inner edge; the sixth ocellus is double; a pale violet line parallel with outer margin forms triangular blotches opposite the last three ocelli, that at the anal angle being the largest; fringes as above.

♀. Colour of the male, but there is no black band on primaries; a blackish shade, broadest near the costa, where it is bordered by some pale yellowish dashes, runs obliquely to beyond third median branch, and then curves inwards to the inner margin; some whitish spots towards apex. The under surface is pale fulvous, and the pale violet lines on the secondaries of the male are replaced in this sex by pale yellowish ones. Expanse: male, 70—74 mm.; female, 78 mm.

Two male and one female specimens, taken in August, at Chang Yang.

Allied to *Lethe (Debis) armandina*, Oberth., from Moupin.

LETHE LABYRINTHEA, sp. n.

♂. Brown, with an olivaceous gloss. Primaries have two dark clouds in the discoidal cell and a blackish central transverse band; from the outer edge of the last, rays are projected along the nervules to the outer margin, intersecting in their course a blackish transverse line; a second abbreviated waved blackish band extends from inner margin to second median nervule. Secondaries have a submarginal series of six black spots enclosed between two wavy ill-defined blackish bands, parallel with outer margin is a narrow

blackish line; fringes white, variegated with blackish at the extremities of nervules. Under surface pale ochreous, tinged with olivaceous; two brown bars in discoidal cell of primaries; central transverse line brown, oblique, with three deep indentations, and edged towards costa with yellowish; some pale spots near costa precede a suffused brownish marginal line. Secondaries with a grey-brown pale-edged band near the base, extending from costa to median nervure, beyond is a brown suffused line curving from costa to abdominal margin, and emitting a spur to the median nervure; central band of unequal width and edged externally with blackish, followed by a broad ochreous marginal band in which is placed a series of six ocelli, the third and fourth are rather indistinct, and all more or less completely encircled with lilacine white; an antimarginal line of the same colour edged on each side with black, and swelling out into lunules opposite the last three ocelli; fringes white, chequered with brownish at extremities of nervules.

♀. Paler; markings of primaries above same as on under surface of male, but with the addition of two small ocelli below apex. Expanse: male, 70 mm.; female, 80 mm.

Four specimens (two males and one female, Ichang, July; one male, Chang Yang, July).

Allied to *L. nigrifascia*, but may be at once separated by the different character of central band of primaries and the larger ocelli.

NEOPE RAMOSA, sp. n.

♂. Closely allied to *S. goschkevitschii*, Mén., from Japan, but the ground colour is dark chocolate-brown, the spots on primaries are smaller, nearly orbicular, pale yellowish buff in colour, and each pair between the median nervules are separated by a quadrate blackish spot. Secondaries have two pale yellowish buff longitudinal patches and three spots; the former each enclose an obscure ocellus and the latter are arranged in a longitudinal series; below are three black spots decreasing in size to the anal angle, the first is partially, the second distinctly, and the third indistinctly surrounded with pale yellowish buff. Under surface blackish, variegated with white and yellowish buff; primaries have a white-centred black spot enclosed in a whitish ring near apex, and below this is a nearly square white spot followed by two pairs of yellowish buff spots as above: secondaries have three basal spots as in *S. goschkevitschii*, but they are paler in colour and the lower one is much larger; the central band is greyish, very irregular in shape and bordered on each side with white. Expanse, 90 mm.

Two males taken in June and July, at Chang Yang.

NEOPE ROMANOV, sp. n.

♂. Chocolate-brown with olive reflections and a metallic green tinge in certain lights; venation not ochreous, there are two transverse series of small yellowish spots on outward half of primaries, but those towards costa are ill-defined. Secondaries have a marginal series of large black spots, each spot edged internally and externally with yellowish except that at outer angle, which is bordered on its hinder edge only. Under surface pale brown tinged with violet-grey. Primaries broadly streaked with ochreous grey along the inner margin; central brown band very narrow, bidentate near costa, then gently curved, emitting a short projection before its termination near anal angle; four antimarginal ocelli, the second almost filled up with white; two brown sinuated lines parallel with outer margin. Secondaries with three yellowish brown ringed spots at the base; the central band is grey-brown with a triple edging of brown, yellowish, and dark brown; seven very distinct antimarginal ocelli.

♀. The inner series of spots on upper surface of primaries distinct. Expanse, ♂ 74 mm., ♀ 80 mm.

Two male and one female specimens taken in July at Ichang. One male example, Chang Yang, July.

SATYRUS MACULOSA, sp. n.

♀. Dark greyish brown. Primaries with three large black yellowish ringed spots towards outer margin; the two lower ones are contiguous. Secondaries have two similar spots above anal angle; fringes pale grey tipped with darker. Under surface pale grey; basal two-thirds and outer margin of primaries thickly sprinkled with brownish; a dark brown line traverses the wing before the three large ocelli; three narrow black lines on outer margin enclose two whitish ones. Secondaries reticulated with brownish on basal two-thirds; ocelli five in number, the two nearest costa contiguous, the other three lie towards anal angle, the fifth least in size; a dark wavy submarginal line and two parallel with outer margin enclosing a whitish one; fringes pale grey. Expanse, 86 mm.

One female example taken in July at Chang Yang.

Allied to *Satyrus arvensis*, Oberth., but differs from that species in having five ocelli of equal size, and further in the absence of white pupils.

PARARGE CATENA, sp. n.

Brown suffused with fuliginous. Primaries traversed by an angulated indistinct dark line bordered externally with paler, most clearly towards costa; a submarginal series of six black spots set in ochreous rings, the first of which is very small and the last two larger than others; marginal line pale. Secondaries with a pale angulated central band and a submarginal series of six ochreous ringed black spots, the third very small and the sixth equal in size to the fourth and fifth, but ill-defined; a pale line parallel with outer margin; fringe pale ochreous, chequered with brown at the ends of nervules. Under surface of primaries grey-brown; a pale ochreous bar, edged with brown, crosses the discoidal cell, and is preceded by a small spot of the same colour; beyond the cell is an angulated dark line edged externally with pale ochreous; this edging forms a triangular patch at costa, and unites with a quadrate spot of the same colour on inner margin; there are six pale ochreous spots towards outer margin, all of which, with the exception of the first, have black centres with white pupils; beyond these is an interrupted short ochreous band, two pale ochreous lines enclosing a brown one parallel with outer margin. Secondaries brown, with an olive tint; some spots and an interrupted white band near the base; central band white, angulated and intersected at the angle by a short longitudinal bar; a submarginal series of six ocelli, the first bipupilated and the third very small, the first three are distinctly bordered externally with white and the last three less distinctly; lines parallel with outer margin whitish; fringes as above. In the female the white markings are rather broader. Expanse, 55 mm.

Seven male specimens taken in July, and one female captured in August, at Chang Yang.

In some respects this species agrees with *Pararge dumetorum*, Oberth., Etud. d'Ent. xl. pt. iv. fig. 20; but it is easily separated therefrom by the ocelli on both surfaces of primaries.

CALLEREBIA ALBIPUNCTA, sp. n.

♂. Primaries blackish brown, outer third paler, towards apex is a large round black patch, enclosing two small white spots encircled with pale fulvous; below is a brighter fulvous cloud. Secondaries blackish brown, paler along abdominal margin; towards anal angle is a fulvous-ringed black spot, enclosing a white dot; fringes tinged with grey. Under surface of primaries red-brown, apex and upper half of outer margin greyish; bipupilated ocellus as above; secondaries dark brown, traversed by innumerable irregular wavy lines; ocellus towards anal angle as above, and there is a white spot in each nervular interspace between it and the costa. Expanse, 54 to 60 mm.

♀. Discal area of primaries suffused with reddish, otherwise similar to male.

Allied to *C. sylvicola*, Oberth., and *C. pratorum*, Oberth. (Etud. d'Ent. xi.), but most closely to the last named; from both species it may, however, be separated by the series of white spots on under surface of secondaries.

Several male specimens taken at Chang Yang in July, and a number of both sexes from Ichang Gorge, taken in August.

This species is fairly constant in the character of marking, but two female examples have the white submarginal spots reproduced on the upper surface of secondaries. One of these specimens has the black patch on primaries pear-shaped, enclosing three white spots, and there is a small ocellus below it, near the outer angle.

CLEROME AEROPE, sp. n.

♂. Drab-brown. Primaries darker towards the outer margin; a conspicuous tuft of fulvous silky hairs on the interior edge of the median nerve near the base. Under surface brown; primaries paler along the inner margin with a triangular vitreous patch below the median nerve; all the wings traversed by three dark reddish brown lines, terminating at the submedian nervure; there are six small yellow spots on the primaries before the submarginal line, that nearest the costa punctiform, sometimes absent; on the secondaries there is a transverse series of five similar spots, the first is near the central line, the fourth and fifth approximate more to the submarginal, whilst the second and third are equidistant from either line. Fringes on both surfaces grey-brown, preceded by a slender brownish line.

♀. Colour of male; outer margin of primaries with a suffused blackish border, broad on costa and tapering towards outer angle; external margin of secondaries is also suffused with blackish. The vitreous patch and tuft of hairs are characters pertaining to the male only. Expanse, ♂ 78—89 mm., ♀ 84—100 mm.

A splendid series, taken in June and July, at Ichang.

This species is closely allied to *C. assama*, Westw., from Assam and Khasi Hills; but it is much paler in colour above, whilst beneath the spots are much smaller; the transverse lines are differently curved, and there is no disposition of the second to unite with the third above anal angle.

HESTINA NIGRIVENA, sp. n.

Whitish green; venation of primaries, and a streak above the submedian nervure, broadly blackish, as also is the median nervure of secondaries and its

branches, but the other veins of this wing are narrow in comparison; outer fourth of primaries black, enclosing a double row of spots of the ground colour; there is also an ill-defined blackish central transverse bar; on the secondaries there is a series of distinct black marginal spots and indications of a submarginal series; these last are placed in a very faint pinkish streak. Under surface, colour as above, but the venation is less broad, and the only distinct black spots are some small linear ones on the outer margins of all the wings; on the secondaries is a faint pinkish streak parallel with outer margin, most clearly defined at anal angle. Expanse, 78—90 mm.

Four specimens (three males, one female), taken in May and June at Chang Yang.

Closely allied to *H. mena*, Moore, from N. India, but may be at once distinguished from that species by the pinkish streak on both surfaces of secondaries, a character which brings it very near to *H. assimilis*.

HESTINA VIRIDIS, sp. n.

♂. Pale greenish, neurulation broadly black; outer third of primaries black, its limit not well defined internally, enclosing a transverse series of large spots followed by smaller ones; these are of the ground colour, and the two last of each series are linear. Secondaries have a marginal and submarginal series of ill-defined black spots; outer margin and fringes black, abdominal fold tinged with yellowish. Under surface whitish green; neurulation and some dashes between the nervules black; outer margin and fringes black: secondaries have the costa beyond the subcostal nervure and abdominal fold yellow.

♀. Similar to the male, but the bar closing the discoidal cell of primaries is almost obliterated, the black of outer third is broken up into a double series of spots below apex, and the venation is less broad. Expanse, ♂ 96 mm., ♀ 110 mm.

Two specimens from Chang Yang (male June, female July).

Allied to *H. assimilis*, but at once distinguished by the total absence of red markings.

HESTINA OBERTHURI, sp. n.

Greyish white, venation broadly fuliginous; outer margins with broad fuliginous borders, that of primaries intersected by one and of secondaries by two transverse rows of small spots of ground colour. Under surface similar to above, but there is a bluish black line on all the wings parallel with outer margin. Fringes white, chequered with black. Expanse, 76 mm.

Several examples taken in June at Chang Yang, and September at Ichang.

In some specimens the pale ground colour is much suffused with fuliginous.

Unlike any species of *Hestina* with which I am acquainted.

EURIPUS JAPONICUS.

Euripus japonicus, Feld. Weiss. Ent Mon. vi. p. 27 (1862).

Var. *chinensis*.

One male specimen captured in August, at a place three days' journey N. of Ichang.

As this example differs from the Japanese form of the species in the much smaller size of the white spots and streaks on both

surfaces, and in having the basal spot, costal and inner marginal streaks of secondaries yellow instead of white, I have given it the varietal name of *chinensis*.

APATURA FASCIOLA, sp. n.

Dark fuscous brown. Primaries edged with yellowish along the costa to beyond the middle, and tinged with the same colour on outer margin; the central area is traversed by a yellow band composed of seven spots, of which the two nearest costa are smaller and the next pair larger than the other three; a white spot towards apex. Secondaries with a central transverse yellow band extending from costa to submedian nervure, and interrupted by the nervules; the outer margin is yellow, tinged with fuscous, and intersected by a transverse line of the ground colour, a black spot above anal angle. Under surface opalescent, clouded with tawny on the outer margin of all the wings; the primaries have a bluish-white spot near apex, below this are three small dots of the same colour and a black dot set in a tawny ring; secondaries with a well-defined ocellated spot near anal angle, and a series of small spots above; the basal half of all the wings is darker than the outer half, and separated by a tawny transverse line, most clearly defined on the secondaries. Expanse, ♂ 74 mm., ♀ 82 mm.

Two male specimens taken in July, and two females in August, at Chang Yang.

ATHYMA PUNCTATA, sp. n.

♂. Black. Primaries with apical and central white spots, shaded on edges with violet-grey; the former is intersected by the subcostal nervure, and the latter by the rays of the median. Secondaries with a large central white spot, shaded with violet as on primaries; broad submarginal line pale. Under surface rusty brown; primaries have white spots as above; a violet-grey longitudinal streak from the base, interrupted by the ground colour before reaching the centre of the wing where it terminates, is broadly bordered below and outwardly with blackish; there are indications of a violet-grey submarginal line; secondaries white along the costa, central white fascia extends from costa to the bluish-grey abdominal fold; submarginal band whitish, tinged with violet and bordered outwardly with a dark brownish shade. Expanse, 68 mm.

Two male specimens taken in May and July at Chang Yang.

ATHYMA DISJUNCTA, sp. n.

Fuliginous-black, with white markings. Discoidal streak of primaries terminating in a somewhat triangular head, and followed by an oblong transverse dash; beyond and nearer the costa are three other oblong spots; central band composed of eight spots, the sixth of which is round and larger than the others, but the fourth is very small or quite absent; submarginal series of linear spots only faintly indicated towards costa, followed by black quadrate spots. Secondaries with central and submarginal bands, the latter composed of linear spots, slightly decreasing in size towards costa; between the bands and also before outer margin are some black quadrate spots. Under surface of primaries blackish, marked with tawny along the nerves; basal and central spots as above, but the fourth spot of the latter series more clearly defined; marginal series large, those nearest the costa nearly obliterated, and the others intersected by a tawny transverse band; secondaries tawny, with a black-edged white streak from the middle of the base to the costa, followed by some black dots; central band bordered with blackish, interrupted, and extending only to the abdominal fold; submarginal

band as above, but the inner edges of the spots are rounded and bordered with blackish; between these bands is a series of conspicuous short longitudinal black dashes, the lower ones edged externally with white; a fairly broad blackish band on outer margin, preceded by an interrupted white one. Expanse, ♂ 68 mm., ♀ 76 mm.

The bands on upper surface are very like those of *A. sulphitia*, but the form of the discoidal streak on primaries is very similar to that of *A. helmanni*.

I have received a splendid series of this novelty from Chang Yang, taken in June and July.

ATHYMA FORTUNA.

Athyma fortuna, Leech, Trans. Ent. Soc. 1889, p. 107, pl. viii. figs. 1, 1a.

A nice series from Chang Yang, June and July.

In some of the male specimens the white spots forming the central band of all the wings exhibit a tendency to elongation, as in *L. sydyi*, Ld., var. *latefasciata*, Mén. (Schr. Reis. p. 29). I propose that this form should be known as var. *diffusa*.

LIMENITIS PRATTI, sp. n.

Black, inclining to brown towards base of all the wings. Primaries with a white transverse bar, preceded and followed by obscure whitish ones in discoidal cell; a central series of six quadrate white spots and beyond a transverse series of smaller red spots, the upper of which are round, and the two nearest costa edged internally with white; submarginal spots white, intersected by a line of the ground colour, that in the second median interspace large and triangular. Secondaries have two black transverse bars enclosing an obscure red one near base; a central series of seven white spots, followed by a series of smaller red ones; outer margin broadly bordered with white, intersected by an interrupted transverse band. Under surface similar to above, but the costa is whitish and the markings are larger, those in the discoidal cell are well-defined, and below the cell there is a large white blotch, transversely intersected by a blackish band; secondaries have the costa edged with red, and there are some reddish and black marks on the white basal third; the other markings same as above, but more band-like in character. Expanse, 69 mm.

One example taken in July at Chang Yang.

This species is more nearly allied to *L. populi* than any other *Limenitis* known to me.

NEPTIS HESIONE, sp. n.

♂. Fuliginous-black, with pale buff markings. Discal streak of primaries broad, partially suffused with blackish, the outer extremity produced and obtusely pointed, two spots near apex, oval and of nearly equal size, separated from each other by the first discoidal nervule, and from an indistinct curved linear spot by the subcostal nerve; a spot in the first median interspace is nearly round and touches both nervules, below are two smaller spots separated by the submedian; submarginal pale and narrow. Secondaries have a fairly broad central band; submarginal band, bordered externally with blackish grey, tapers from costa, attains its greatest width in the submedian interspace, and from thence is attenuated to abdominal margin; between the bands is a transverse series of oblong black spots.

Under surface chocolate-brown; markings white, streaked with ochreous-grey, and clouded with whitish along the costa; discal streak broad, clear and distinct, with a large blackish patch below; apical spots hardly separated; spot in first median interspace invades the space above and unites below with the enlarged pair on inner margin; submarginal line white tinged with violet, interrupted towards apex by two longitudinal streaks of the ground colour, and preceded by a chocolate-brown band, which is narrowly edged inwardly with blackish grey, and intersected by a transverse series of pale lunules: secondaries with basal, central, and submarginal bands; the first traverses the wing from base to costal nerve, where it is cut into by the ground colour; the second is bordered externally with blackish grey, followed by ochreous-grey; the third is tinged with violet, preceded by an interrupted band of the ground colour, bordered with ochreous-grey, and followed by a series of lunules, also of the ground colour, edged externally with whitish. Fringes chequered black and white. Expanse, 56 mm.

One male specimen taken in July at Chang Yang.

Closely allied to *N. armandia*, Oberth., but differs from that species on the upper surface in the broader discal streak, closer proximity of the apical spots, and pale submarginal band of primaries; also in the broader central and uninterrupted submarginal bands of secondaries, whilst beneath there are several points of difference.

NEPTIS THISBE.

Neptis thisbe, Mén. Bull. Acad. Pet. xvii. p. 214 (1859); Schrenck's Reisen, ii. p. 26, t. 2, fig. 9 (1859); Elwes, Proc. Zool. Soc. 1881, p. 894.

An extensive and somewhat variable series from Chang Yang, where the species appears to be on the wing from June to August.

Var. *themis*.—Fringes of primaries almost wholly white at the apex, and black from the fifth subcostal nervule to below first discoidal nervule; there is no trace of fulvous on the outer margin of secondaries. On the under surface of primaries the spot between discoidal nervules is large, round, and without a trace of marking below it in next interspace; the central band of secondaries terminates in a large white spot between the subcostal nervules, and there are no markings in the interspace above or between the band and discal streak, which in this form is distinctly white.

Three examples (two males, one female).

Var. *thetis*.—Identical with var. *themis* above, but beneath there is a white mark in interspace below the outer round spot of primaries; the discal streak and submarginal band of secondaries are merely fragmentary; the basal and terminal portions of the former only remain, and of the latter there are some traces towards outer angle. There is also a noticeable absence of brown clouding on secondaries, and the brown band posterior to the white central one is very narrow.

Four examples (three males, one female).

There are intermediates between each of these forms and the type.

NEPTIS ANTILOPE, sp. n.

Black, with a slight brownish tinge; markings yellow. Discal streak of primaries obtusely pointed, two oblong spots and a dot above towards apex,

an oval spot below intersected by second median nervule, and a wedge-shaped one on inner margin interrupted by the submedian nervule; submarginal band pale and narrow. Secondaries have central and submarginal bands; the former is somewhat narrow, and the latter tapers towards either extremity. Under surface of primaries chocolate-brown, a broad patch of yellowish occupies the space between costa and median nervule, absorbing the paler discal streak; the outer limit of this patch is marked by some whitish spots, and the upper portion of black suffused patch, which lies between median nervule and inner margin, extends to the narrow reddish brown submarginal band, and encloses a large yellowish white spot; outer margin has a broad yellowish border, intersected by one paler and one darker indistinct lines; the apical portion of the border extends inwards and amalgamates with the two oblong spots; secondaries yellowish; central band white, edged externally with blackish grey, and followed by a chocolate-brown wavy band, the upper portion of which is broadly bordered with violet-grey; submarginal band light chestnut. Fringes white, with black patches at tips of nervules. Expanse, ♂ 58—67 mm., ♀ 67 mm.

Two male specimens taken in June, and one female example in July at Chang Yang. I took two specimens at Hong Kong in March, 1886; these are smaller than those from Central China.

This species superficially resembles *N. thisbe*.

NEPTIS CYDIPPE, sp. n.

Similar in size and shape to *N. thisbe*; the markings, however, are very like those of *N. antilope* on the upper surface, but there are three pale spots from middle of costa of primaries, and the costal spot of apical trio is much larger. Under surface of primaries chocolate-brown, suffused with pale ochreous between costa and discal streak; outer margin broadly bordered with same colour, intersected by a narrow interrupted chocolate-brown band; inner margin to median and first branch dark grey, a blackish patch above in first median interspace; some violet-tinted whitish spots from costa to outer end of discal streak; apical spots whitish, as also are those in the median interspaces, but the outer edges of these last are more or less encroached upon by the marginal border. Secondaries pale ochreous tinged with brownish, and clouded with chocolate-brown on outer portion of costa; some violet-grey and chocolate-brown marks between the costal and second subcostal veins; central band whitish, bordered externally by a suffused chocolate-brown band, the outer edge of which is irregular; beyond are some chocolate-brown spots, followed by a pale transverse band and some obscure brown spots. Expanse, ♂ 70—77 mm., ♀ 84 mm.

Several specimens of each sex taken in July and August at Chang Yang.

NEPTIS BEROE, sp. n.

♂. Brownish black, with yellow markings. Primaries have a broad discal streak interrupted by the third median branch, and continued downwards as a curved spot, which is interrupted by the second median branch and terminates at the first, below is a somewhat triangular patch intersected by the submedian nervule; towards the apex are two large oblong spots, separated by the subcostal nervule from a long streak on the costa. Secondaries have broad central and narrower submarginal bands; the costa is broadly glassy. Under surface pale fulvous, outer margins of all the wings paler; primaries have curved discal streak and spots on inner margin as above, but whitish in colour, the lower spots of the two towards apex is obscured by a greyish suffusion, and the same colour replaces the linear yellow patch on costa; between these spots and two indistinct ones just below middle of costa is a bright chestnut-brown cloud, the narrow

submarginal band terminating in a dark grey cloud on inner margin is of the same colour, and is bordered externally with paler whitish: secondaries tinged with greenish between costal and second subcostal nervule to beyond the middle, where there is a small bright chestnut-brown cloud; the white central band is suffused with greyish at its outer extremity, and has a clouded brownish edging; submarginal band whitish, with a violet tinge, interrupted by the nervules, bordered on each side with dark grey, and preceded by a bright chestnut-brown band tapering from the outer angle to inner margin. Fringes white-chequered, except at fourth subcostal, with black patches at the extremities of the nervules.

♀. Darker; streak and bands narrower, spots rather smaller, the patch on costa of primaries represented by a small linear spot and some yellow scales; the costal border of secondaries is not glassy. The under surface is more suffused with bright chestnut-brown, the space enclosed by curved discal streak is black, slightly glossy towards base. Expanse: male, 68 mm.; female, 70 mm.

Two males and one female, Chang Yang, taken in June.

NEPTIS ASPASIA, sp. n.

Black, tinged with brown; markings yellow. Discal streak of primaries interrupted at the fork by the third median branch, the continuation has its external edge gently curved, and below its extremity is a nearly round spot in the first median interspace. Secondaries broadly cinereous along costal third; central band, which is white on the abdominal fold, runs straight towards outer margin, but is interrupted by the costal border; submarginal band tapers from outer angle, the upper portion obscured by costal border. Under surface chestnut-brown, inner portion of primaries below discal streak and curved extension leaden grey; some violet-grey spots from middle of costa, a large white spot below submedian, and a violet-grey dash above, together with an ill-defined pale violet spot in discoidal interspace are edged externally by an undulated transverse dusky line; parallel with the outer margin is an interrupted pale violet line: secondaries, white central band bordered on each side with blackish grey, curves upwards from second subcostal nervule in the direction of outer angle, and is followed by two wavy narrow greyish bands, each bordered with darker; submarginal band pale violet, bordered with greyish, tapering from outer angle; an indistinct grey line parallel with outer margin. Fringes white, with patches of black at tips of nervules, preceded on the under surface by a broad dark line. Palpi pale grey, with dense black hairs. Eyes plum colour. Expanse, 80 mm.

One example from Chang Yang, taken in July.

NEPTIS ANTIGONE, sp. n.

Very similar to *N. aspasia* on the upper surface, but the spot in first median interspace forming continuation of discal streak is larger, rounder, and more completely isolated, whilst the costal band of secondaries is broader, and traverses the wing from abdominal margin, where it is but slightly paler, to middle of subcostal nervure, the submarginal band is also much broader, and commences below the subcostal nervure. Under surface dark ochreous brown, the discal streak proper and a portion of the extension are much suffused with this colour, the spot below in first median interspace is fairly distinct, and only separated by the first median nervule from a white dash extending to inner margin, the enclosed space is black; a curved series of four blue-tinted white spots from middle of costa and a large white one beyond; an obscure brown narrow band commences on the costa, skirts the external edge of white spot, and then turns outwards and downwards parallel with outer margin, terminating in a black cloud on inner margin; secondaries paler towards base; central band tinged with violet and

bifurcated towards costa, followed by a broad bluish grey line; submarginal band white tinged with violet, and intersected by a transverse line of the ground colour; there are some indications of a line parallel with outer margin. Palpi white, with black hairs; eyes brown. Expanse, 78 mm.

One example, Ichang, May.

NEPTIS ARACHNE, sp. n.

Resembles *N. berce* and also *N. aspasia*, in the markings of upper surface, but it lacks the central streak of the former, and the apical spots are more clearly separated in the latter, whilst it differs from both in the rupture of discal streak from its continuation at second median fork. In this species the disconnection is effected, not only by the passage of the third median nervule, but by the interposition of a triangular patch of the ground colour in the fork. Under surface bright chestnut-brown. Primaries ochreous at base and along costal fold, a bluish grey discoidal spot, some ochreous scales at the commencement of the discoidal nervules and a suffused ochreous mark to discal streak below; beyond is a curved series of four large bluish grey spots, and nearer the apex a pale ochreous spot, above which are some ochreous streaks; dentated submarginal line ochreous, narrowly edged internally with ground colour, preceded by some ochreous suffused patches, and bordered externally by a band of the ground colour; outer margin broadly ochreous, intersected by a transverse interrupted line of the ground colour; discal streak and curved continuation pale ochreous, enclosed space blackish grey, which colour is continued below the first median nervule to border of outer margin; secondaries ochreous, basal half of costa tinged with chestnut; a broad suffused patch of bright chestnut-brown from outer half of costa to discoidal nervule, and from thence continued as a narrow band to abdominal margin, the patch encloses some bluish grey marks and there are some chestnut spots towards base; broad central band pale ochreous, suffused with dark grey beyond the third median and bordered externally with bright chestnut-brown, this is followed after an interval by a narrow transverse band of the same colour, as also is the sinuous submarginal line. Fringes white, with black patches at extremities of nervules, that at fourth subcostal is small whilst those of second and third median nervules approximate, leaving a very slender space of white. Expanse, 77 mm.

One male example taken in July at Chang Yang.

IOLAUS LUCULENTUS, sp. n.

♂. Light blue, finely dusted with black scales; costa and outer margin of primaries to below third median nervule broadly black. Secondaries with two white-tipped black tails; costa bordered with black, abdominal margin broadly whitish; two black spots on outer margin towards the black anal angle, which has an orange-brown lunule; fringes white, chequered with black at extremities of nervules and preceded by a black line. Under surface pale greyish white; primaries have linear discoidal spot and central transverse lines blackish; submarginal line dusky; secondaries have a blackish discoidal bar and transverse wavy central lines; there are also two blackish linear spots, one near base and towards costa, the other about the middle of inner margin; submarginal line dusky; a black spot at anal angle, and one between second and third median nervules, the first narrowly, and the last broadly bordered with reddish orange.

♀. Paler; black border of primaries narrower over cell, disclosing a distinct black discoidal spot, beyond which is a whitish cloud. Expanse, ♂ 40 mm., ♀ 44 mm.

Four male and three female specimens taken in July at Chang Yang.

Allied to *Iolaus longinus*, Hew.

IOLAUS CONTRACTUS, sp. n.

♂. Black, ornamented with bright dark blue, which on the primaries forms a patch extending from the base to the middle of the disc between the median and submedian nerves, slightly encroaching beyond each boundary. On the secondaries the blue forms a broad oblique abbreviated band, its anterior limit being the second subcostal nervule, and its posterior the first median, but there is a small triangular mark beyond this latter boundary, extending to the orange spot at anal angle; there are some black spots towards the outer edge of the blue band; the abdominal margin is paler, becoming whitish at the base. There are two tails of equal length, both black with white tips. Under surface of primaries whitish grey; discoidal spot linear white; central transverse line blackish, terminating at the submedian nervure; submarginal line indistinct; on the middle of inner margin is a fan-like arrangement of long dark grey hairs; central transverse line of secondaries wavy, turning off at a right angle to abdominal margin when opposite anal angle; outer margin bordered with dark grey, intersected by a band of ground colour; a large black spot on the outer edge of a round orange patch before the first tail, and one at angle preceded by an orange streak.

♀. Greyish black, with a patch of pale lilac-blue on the disc of primaries, and some scales of the same colour towards outer margin of secondaries; fringes grey. On the under surface the lines are more distinct, and the spots larger. In one female specimen the lilac-blue is only shown on the primaries as a discal suffusion. Expanse, ♂ 38 mm., ♀ 40—42 mm.

Allied to *I. iapyx*, Hew.

THECLA ELWESI, sp. n.

♂. Fuscous brown, the discal area of primaries tinged with reddish orange, especially behind the black bar which closes the discoidal cell. Secondaries with some black spots and orange marks on outer margin at anal angle; tail reddish orange, edged with black and tipped with white. Under surface sandy brown, dusky discoidal bar edged with white, followed by an oblique triangular streak darker than the ground colour and bordered on each side by a white-edged dark line; a dusky line, edged externally with paler parallel with outer margin; secondaries with two white central transverse lines, the first edged externally with dusky and not extending beyond the median nerve, the second slightly wavy, bordered internally with dusky, and curved inwards beyond the second median nervule; outer margin bordered with reddish orange, edged internally with pale ochreous, wider towards anal angle, the orange colour extending halfway along the abdominal margin; a black spot at anal angle and one in the second median interspace; fringes white, preceded by a black line which traverses the tail to the white tip.

♀. Orange-brown, clouded with greyish brown towards the base of all the wings, apex and outer margin black; a black spot on secondaries in second median interspace; fringes whitish, grey at the base and extremities of nervules. Under surface of primaries reddish orange, secondaries rather browner; markings as in the male, except that the first transverse line of secondaries extends farther across the wing. Expanse 50 mm.

One female taken in July, and two males captured in August, at Chang Yang. Also two female specimens taken in the latter month, at Ichang; these have the basal half of all the wings suffused with greyish brown, and the marginal border of primaries is broader.

The male bears a superficial resemblance to the same sex of *T. betulæ* from Europe, but it is much larger and the tails are longer and more slender.

THECLA ORNATA, sp. n.

♂. Primaries blackish, with a large reddish-orange patch on the disc, intersected by the second and third median nervules; fringes dark grey. Secondaries fuliginous brown, with a short tail at the extremity of the second, and a much longer one at the extremity of the third median nervule; both are black, tipped with white; fringes white, tipped with black and preceded by a black line which towards anal angle is edged internally with whitish. Under surface olivaceous grey; central transverse line of primaries white-edged internally with black; submarginal series of black spots bordered with white and increasing in size towards inner margin: secondaries have a white central line inwardly edged with black, and uniting in the second median interspace with a submarginal line composed of white-edged black spots, and followed by a reddish-orange patch, which is widest between the second and third median nervules, and hardly to be traced beyond the first median branch; from the abdominal margin, above the orange patch, are two short black-edged oblique lines, approximating at their discal extremities; between the termination of these lines and the juncture of central and submarginal lines is a black-edged white curve; a black spot at anal angle, between which, and one in the second median interspace is a pale blue patch edged internally with black; fringes of all the wings olivaceous grey, preceded by a dark line, which is edged internally with white, especially on the secondaries.

♀. Fuliginous brown, without reddish-orange patch. Under surface as in the male. Expanse, ♂ 32—34 mm., ♀ 35 mm.

Two male and one female specimens taken in July at Chang Yang.

Allied to *T. v-album*, Oberth. Etud. d'Ent. xi. pl. iv. fig. 23, but the reddish-orange patch on upper surface of primaries is more in the centre of wing, and the markings of under surface are of a very different character.

THECLA RUBICUNDULA, sp. n.

♂. Fuliginous-brown. Primaries with a discal reddish orange suffusion. The tail of secondaries hardly darker, narrowly tipped with white; fringes grey. Under surface brown; outer margin of primaries broadly tinged with reddish orange; central transverse line white, bordered internally with dark brownish; there are some indications of a submarginal series of black dots; central transverse line of secondaries white, bordered internally with dark brownish, and bidentated before reaching the abdominal margin; outer margin broadly bordered with reddish orange, and preceded by a submarginal series of small black spots, edged internally with bluish; a black spot at anal angle, and one in the second median interspace; between these is a faintly blue triangular spot. Expanse, 31 mm.

Two male specimens, Chang Yang; June.

Allied to *Thecla ornata*, but the primaries are paler and the reddish orange colour does not form a distinct patch; on the under surface the red markings at once separate it both from *T. ornata* and *T. v-album*.

DIPSAS MINERVA, sp. n.

♀. Pale orange-brown; outer margin of primaries narrowly bordered with black, broader at the apex. Secondaries with a black spot on outer margin between second and third median nervules, and another at anal angle; fringes grey, darker at the tips and extremities of nervules, preceded

by a black line, which traverses the tail to the white tip. Under surface rather paler than above; primaries with an interrupted white submarginal line, edged internally with black, followed by a series of white lunules, edged externally with black, and enclosing reddish orange spots; secondaries have a white submarginal line, edged internally with black, with three deep indentations before abdominal margin, followed by an undulated black-edged white line enclosing some reddish orange spots and two black ones; one of these last is placed at outer angle, and the other, which is edged with reddish orange, between second and third nervules; the orange spots are edged externally with black, intersected by short projections from a white line parallel with outer margin; fringes and tail as above. Expanse, 37 mm.

In one of the specimens the border of outer margin and apex is very faintly indicated.

Five female specimens taken at Ichang in June.

Allied to *Dipsas* (*Thecla*) *seraphim*, Oberth. Etud. d'Ent. xi. pt. 5, fig. 37, from which it differs principally in the arrangement of markings on under surface of secondaries.

DIPSAS COMES, sp. n.

♀. Closely allied to *D. minerva*, but the black border of primaries is confined to the apical and costal areas; on the secondaries there is no black spot, but there are traces of a pale submarginal line, which is deeply indented before abdominal margin; the under surface is browner, there are no markings on the primaries beyond the submarginal line; the submarginal line of secondaries starts from a point nearer the middle of costa, has only one deep indentation before abdominal margin, the line following extends only from the outer angle to second median nervule and forms a series of arches interrupting the broad reddish orange marginal border; there is no black spot at outer angle, and that between the second and third median nervules is smaller. Expanse, 38 mm.

One female example taken in July at Chang Yang.

DIPSAS MELPOMENE, sp. n.

Pale orange-brown; apex of primaries, tail, and anal angle of secondaries black. Under surface rather browner than above; primaries streaked with whitish along the inner margin, discoidal bar and submarginal line darker, the latter faintly edged externally with whitish; secondaries with dark discoidal bar edged with whitish; submarginal line white, curved, and slightly indented before abdominal margin, followed by a paler shade of the ground colour; a spot between second and third median nervules and one at anal angle black; the marginal border is of the ground colour, intersected by a paler line to the second median nervule, then pale reddish orange to the abdominal margin; fringes of the ground colour, preceded by a darker line to the second median nervule, from which point to the anal angle the fringes are white, preceded by a black line, which traverses the tail to the white tip. Expanse, 40 mm.

One example captured at Chang Yang in August.

Allied to *T. jonasi*, Janson, but easily distinguished therefrom by the different character of the apical patch of primaries above and the markings on the under surface of secondaries; the tails are longer and more slender.

DIPSAS THESPIS, sp. n.

Pale orange-brown; tail, anal angle, and spot between second and third median nervules black. Under surface pale ochreous-brown, with central transverse and submarginal lines of primaries white, the first bordered internally and the last externally with black: secondaries have an internally black-bordered white central line projecting sharply outwards before reaching the abdominal margin, and a submarginal series of connected black-edged white lunules, the first of which at the outer angle is followed by a black spot; another larger black spot displaces the lunule between second and third median branches; this is surrounded with reddish orange, and the marginal border is tinged with the same colour; a small black spot at anal angle, and there are some short longitudinal black dashes before the black line at base of the white fringes. Expanse, 33 mm.

One example, taken at Ichang in August.

Allied to *Dipsas* (*Thecla*) *lutea*, Brem., but differs from that species very materially in the markings of under surface of secondaries.

RAPALA REPERCUSSA, sp. n.

♂. Fuliginous-brown, with strong purple reflections; fringes slightly paler; tail of secondaries black, tipped with white; lobe at anal angle marked with blue and pale orange. Under surface olivaceous-brown; primaries have a faint pale linear discoidal spot and central transverse line, the latter with an interior edging of fuscous; submarginal line indicated only towards inner margin: secondaries have a dark discoidal bar outlined with white; a waved white line broadly bordered interiorly with fuscous, and preceded by a thin wavy white line, forming a compound band extending only to the submedian nervure, is intersected by the nervules, and exhibits a tendency to become broken up into spots; at its termination are two short parallel white lines running to abdominal margin; submarginal line whitish wavy; a large velvety black spot encircled with orange in the second median interspace; the lobe at anal angle is black, with white fringe, above it is a blue spot, and two small patches, one orange and the other blue separated by a black streak; fringes of abdominal margin white. Expanse, 40 mm.

♀. Rather browner, and the purple reflection is less intense.

Ten males, two females, Chang Yang; July.

Allied to *Rapala* (*Deudorix*) *manea*, Hew. Ill. D. L. p. 23, pl. 9, figs. 40, 41 (1863).

In some examples of the male there is a distinct reddish orange cloud just beyond the discoidal cell on primaries; this is faintly indicated in other males and one female specimen.

RAPALA SUBPURPUREA, sp. n.

♂. Closely allied to *R. reperculsa*, but the purple reflection is more vivid, and on the primaries almost confined to the lower half of the wing; the lobe at anal angle of secondaries is black, with white fringes tipped with black. On the under surface the primaries are greyer on the inner margin; the discoidal spot is outlined indistinctly; the transverse line is dark olive-brown, edged externally with whitish, and more obliquely placed; submarginal line pale. The central transverse line of secondaries is dark olive-brown, edged externally with whitish, and internally, towards abdominal margin, where it forms a distinct W, with tawny; submarginal line dusky; the black spot in second median interspace has an inner border of reddish

orange, between this and black anal lobe is a dark patch powdered with whitish scales. Abdomen below yellowish. Expanse, 38 mm.

♀. The primaries are rather more uniformly suffused with purple.

Nine males, three females; Chang Yang, June and July; Ichang, July.

LYCÆNA ARCANA, sp. n.

♂. Brown; secondaries with a slender short black tail fringed with white; discoidal spot of primaries black; discal area suffused with pale blue, as also is the basal area of secondaries, which is further adorned with a submarginal row of black spots, the last two bordered internally with orange, and externally with whitish. Under surface pale grey; discoidal spot, central, and submarginal lines of primaries dark grey, bordered with white. The secondaries have three black basal spots; discoidal spot and central line dark grey, bordered with white; the line is much interrupted, especially towards the costa, and is represented on the costa itself by a black spot outlined with white; submarginal line wavy dark grey, and preceding a series of triangular spots of the same colour on the outer margin; two black spots towards anal angle, edged outwardly with metallic-blue and inwardly with orange.

♀. Similar to male, but without the blue suffusion. Expanse, ♂ 31 mm., ♀ 33 mm.

One male, Chang Yang, June; one female, Ship-y-Shan, September.

Allied to *L. argiades*, but differs therefrom in the ornamentation of under surface.

LYCÆNA NEBULOSA, sp. n.

♂. Lilac-blue, suffused with fuscous. Primaries have some pale blue scales along the costa, and a distinct black discoidal spot; the outer margin is broadly bordered with black, and the central series of spots of the under surface are faintly indicated. Secondaries have all the margins broadly bordered with black. Fringes white. Under surface pale greyish white; linear discoidal spot and central series of spots on primaries black; submarginal series of dark grey lunules, followed by a series of blackish linear spots on the outer margin: secondaries have a basal series of three, and a central series of eight, black spots; discoidal spot is linear and very narrow, the markings beyond are similar to those on primaries, but the spots on the margin in the median interspaces are round and larger; fringes white, streaked with grey, and preceded by a thin blackish line. Expanse, 36 mm.

One male specimen taken in June at Chang Yang.

Somewhat resembles the female of *L. argiolus*, but differs therefrom in the shape of primaries, shade of blue, and markings of under surface.

SATSUMA CHALYBEIA, sp. n.

♂. Pale blue; costa, apical third, and outer margin of primaries black, as also are the fringes; secondaries with an interrupted black submarginal band; a broad black line before the black and grey fringes. Under surface grey dusted with black atoms, basal half of primaries blackish, discoidal spot, central and submarginal wavy lines black; transverse band of secondaries occupying the central third of wing blackish limited by black wavy lines, submarginal line black, undulating, followed by some obscure dusky spots; fringes as above. Expanse, 30 mm.

One male example, Chang Yang, May.

Differs from *Satsuma* (*Thecla*) *frivaldszkyi*, Ld., in having two distinct transverse lines on upper surface of primaries, and in the absence of white markings on under surface of all the wings.

SATSUMA PRATTI, sp. n.

♂. Fuliginous-brown. Primaries have some blue scales below the median nervure, and the secondaries have a dull bluish reflection. Under surface of primaries brown, suffused with blackish towards the black basal area, an indistinct wavy dark central line bordered with white at costa; secondaries black irrorated with white scales, and a brown cloud towards outer angle, the indented central line broadly bordered with white below costa and on inner margin; submarginal band wavy ill-defined and intersected by a pale wavy line. Expanse, 30 mm.

One male specimen taken in June, at Ichang.

Separable from *Satsuma* (*Thecla*) *frivaldszkyi* by the darker colour of all the wings, and by the white markings and blackish ground colour of under surface of secondaries.

AMBLYPODIA ANGULATA, sp. n.

♀. Costa of primaries slightly sinuous, outer margin dentate and rather concave from apex to middle. Costa of secondaries convex near the base, then concave to the acuminate and vertical apex from whence the outer margin descends obliquely to the middle when it becomes rounded; tails are somewhat spatulate. Black with a strong suffusion of bluish purple, intersected by the black venation, on the disc of all the wings; discoidal spot of secondaries black and bar-like. Under surface of primaries blackish, with a large quadrate pale grey blotch on the greyish inner margin, preceded by some short brownish grey transverse lines on the disc; central line brownish grey, curved and wavy; submarginal line darker, edged internally with black, twice angulated above inner margin, and followed by some indistinct dark grey-brown lunules: secondaries grey irrorated with black, suffused with violet towards the base and clouded with obscure purplish violet over the rest of the wing; several pale but ill-defined transverse lines. Expanse, 40 mm.

One female example received from Chang Yang.

Amblypodia ganessa, Moore, Cat. Lep. E. I. C. p. 44, pl. 1a, fig. 9 (1857). Var. *seminigra*.

♂. Primaries blue paler beyond cell, costa and outer margin deeply bordered with black; the discoidal spot, which is within the costal border, is more intensely black. Secondaries black suffused with blue most pronounced along the central area. Fringes fuscous grey. Under surface pale brownish grey with four whitish wavy edged darker bands, the first two are basal the third is abbreviated the fourth broad and the only one which is clearly defined; submarginal line slender and interrupted: secondaries greyish brown with four interrupted bands these are of the ground colour, but darker at the edges and bordered with whitish; brownish submarginal line wavy, bordered with whitish and followed by a few brownish linear dots on the margin; fringes pale grey preceded by a darker line. Expanse, 32 mm.

One male example, Chang Yang, June.

DODONA MACULOSA, sp. n.

♂. Black with fulvous and white markings. Primaries have an oblique central band represented by a bar in the discoidal cell and one below to the inner margin; beyond is a slender linear discoidal spot, followed by a larger

double spot intersected by the discoidal nervule; above is a small dot on the costa, and below are three roundish spots, those in the submedian and first median interspaces are out of line and nearer a submarginal series of spots, the last of which is linear and slightly curved, the next round, and the one above dot-like; the remainder of the series comprises two pairs of white spots, but the initial one of the costal pair is very small; there are two other white spots nearer the apex. On the secondaries the markings comprise an oblique streak from the costa to the submedian nervure, one beyond extending nearly to the anal angle, but interrupted by first pair of median branches; a short bar from the costa broken up by the venation into three spots; a submarginal band also interrupted; all, together with a line parallel with outer margin, are obscure fulvous; the anal lobe and tail are black, the former bordered with whitish. Fringes grey tipped with black. Under surface inclined to brown; all the markings of primaries are similar to above, but rather paler, less interrupted, and with the addition of a basal band and a marginal series of linear spots. Secondaries with a pale fulvous streak along abdominal margin, which unites before the anal angle with one running from the base parallel with submedian nervure, and enclosing a third broader streak; an oblique white streak from the costa terminates on the submedian nervure in a point, and beyond is a party-coloured streak, white at the costa, pale fulvous to the second median, and then white again to its termination; the whitish submarginal band is preceded by a black interrupted streak and followed by a black transverse dash from the costa; a broad pale fulvous line, white near costa, parallel with outer margin; anal lobe and tail velvety black edged and fringed with white, above is a whitish cloud.

♀. Similar to the male, but the markings are paler, much larger, and less interrupted. Expanse, ♂ 39 mm., ♀ 42—46 mm.

Two females, Chang Yang, June; four males, two females, Ichang, July.

Allied to *D. egeon*, Dbld., from N. India, but easily distinguished by the different characters of the markings. It is also very close to *D. eugenes*, Bates, and may possibly be only a local form of that species.

LEUCOPHASIA GIGANTEA, sp. n.

♂. White. Primaries with a large black spot on the second discoidal nervule, sometimes extending upwards to the first; a smaller one on the discocellular. Under surface of primaries with the black spots faintly reproduced. Secondaries have an angulated suffused band indicated by a blackish costal streak, and a curved mark between the discoidal and third median nervules; discoidal cell intersected by a longitudinal black bar; the venation is dark, especially on the secondaries and outer margin of primaries. Head black; collar yellow; thorax black dusted with white; pectus sprinkled with yellow; abdomen white.

♀. Under surface of secondaries and apex of primaries tinged with yellowish, the black markings more band-like, with the addition of a zigzag black submarginal line; all these markings are faintly seen through from above. Expanse, ♂ 48—62 mm., ♀ 72 mm.

The specimens of the May brood are without black spot on primaries, the colour is more creamy, and the venation appears more prominent. I propose the name of *immacula* for this seasonal form.

The type is separated from the other species of *Leucophasia* by the large black spot on primaries, and both forms are distinguished by the yellow collar.

A fine series taken at Chang Yang in May and August.

PIERIS OBERTHURI, sp. n.

♂. White. Primaries: costa bordered with black; nervules edged on each side with black, expanding towards the outer margin, which appears in consequence to be deeply bordered. Secondaries black at outer angle and half-way along the costa; nervules bordered with black, and there are streaks of the same colour in the interspaces, pointed towards outer margin and bifurcated at their inner end. Under surface similar to above, but the streaks in interspaces of secondaries are connected with the borders of nervules; a deep yellow patch at base of secondaries.

♀. The black borders of nervules of primaries are not quite so broad as in the male, but otherwise there is no difference in the markings of the sexes. Expanse, ♂ 80 mm., ♀ 92 mm.

In one specimen the whole of the primaries is black with the exception of the discoidal cell, a broad patch from the base between the median nerve and inner margin, intersected by the submedian and a curved series of five oblong spots beyond the middle of the wing.

A fine series taken in April and June, at Chang Yang.

Allied to *P. acraea*, Oberth., but differing therefrom in the character of the marginal borders.

DELIAS PATRUA, sp. n.

♂. Black. Costa, inner angle, discoidal cell, and nervular interspaces streaked with grey, the streaks in latter are attenuated towards outer margins, before which they unite with a whitish-centred grey spot, those nearest apex are linear, and the streaks preceding are not always well defined. Secondaries, inner area of the wings within submedian nervure, and a portion of interspace above canary-yellow, each interspace above has a grey streak, those between the median nervules are centred with white, and the upper one is only separated from a broad discal streak by the disco-cellular nervule; a series of grey spots before the outer margin, those nearest anal angle with yellow linear centres. Under surface black; primaries with the streaks and spots as above but white, the costa is only sprinkled with grey scales, there are two short yellow dashes between costa and submedian nervure towards apex, and the spots nearest apex are more or less yellow: secondaries have canary-yellow markings, a broad patch at the base intersected by the præcostal, a broad streak, whitish towards base, in the discoidal cell; inner area as above; a central and submarginal series of spots, but the former are only suffused with yellow to a greater or lesser extent. Fringes grey and black.

♀. Fuliginous-black, the costa less grey, the streaks are shorter and are not connected with the spots towards outer margin; the inner area above is whitish towards abdominal fold. Expanse, ♂ 88 mm., ♀ 92 mm.

A fine series, Chang Yang, June.

Closely allied to *D. belladonna*, but at once separated by the absence of yellow patch at base of secondaries.

PTEROGOSPIDEA DIVERSA, sp. n.

Brownish black. Primaries have three subhyaline spots on the disc, and five very small ones towards apex, the central spots form a triangle, a lunar or linear one at end of discoidal cell, one rather larger and more quadrate beyond, and a still larger one below, of the outer five the second is punctiform and placed inwards, the fourth rather outwards, and the remaining two are directly under the first; a white spot in the submedian interspace under the larger subhyaline one. Secondaries have a broad white central band

terminating on the inner margin opposite a white band on the abdomen, and there are some black spots on its upper external edge. Fringes of primaries black, spotted with white above inner angle; of secondaries white, tinged with grey, becoming darker towards outer angle, and with a slender blackish line at their base preceded by some white spots. Under surface as above, but the white spot in submedian interspace is rather larger, and is followed by a whitish shade: the central band of secondaries is also wider, and encloses two black spots, there is a faint indication of a pale submarginal line; there are some bluish grey hairs at the base. Head and thorax tinged with yellow. Palpi yellowish, and the pectus is tinged with same colour.

A nice series from Chang Yang, taken in June.

Nearly allied to *P. sinica*, Feld., but easily distinguished therefrom by the different maculation.

PLESIONEURA GRANDIS, sp. n.

♂. Fuliginous brown, all the wings paler towards base. Primaries with a greyish apical patch and three subhyaline spots, one in the discoidal cell, a larger one below and a little beyond in the first median interspace, and a smaller one in the interspace above; fringes pale grey, becoming darker towards apex of primaries. Under surface of primaries greyish, costal half suffused with fuliginous from the base to just beyond the subhyaline spots: secondaries fuliginous brown, sprinkled with ochreous scales; fringes as above,

♀. Similar in colour to the male, but without the greyish apical patch on primaries; the subhyaline spots are larger, the two central ones are only separated by the median nerve. Expanse, ♂ 55 mm., ♀ 68 mm.

Two male specimens taken at Chang Yang, in April, and one example of each sex from Ship-y-Shan, captured in September; these have elongated primaries, whilst those from Chang Yang have broader secondaries.

PAMPHILA VIRGATA, sp. n.

♂. Dark brown. Primaries have a fulvous streak from base parallel with costa to beyond the middle, this streak is broken up by the subcostal nervules into linear spots, its outer extremity curving downwards, and terminate directly over four fulvous spots placed in the median and submedian interspaces, there are two more or less confluent yellow dashes in the discoidal cell, and the base and inner margin are streaked with fulvous scales. Secondaries tinged with fulvous towards base with some fulvous-centred dashes. Fringes yellow, chequered with dark brown. Under surface of primaries blackish, with centre spots as above, but the costal streak and discoidal spots are not so clearly defined, the apical half of outer margin is suffused with yellow, but the base is not sprinkled with yellow scales. Secondaries yellow, with some spots at the base, an indistinct central band, and two parallel transverse series of black spots before the outer margin, black, more or less obscured with yellow; the abdominal fold is streaked with blackish.

♀. Similar in ground colour to the male, but the yellow costal streak is ill defined, except above the one discoidal spot, the central spots are smaller, and all are pale in colour. Expanse, 30—32 mm.

A fine series from Chang Yang and Ichang, taken in June and July. I took examples of each sex at Foochau in April, 1886.

Allied to *P. maro*, Fab.

PAMPHILA MAGA, sp. n.

♂. Superficially resembles *P. virgata*, but the thorax is much stouter, and the primaries are without the yellow costal streak of that species, there are two yellow spots in discoidal cell, the lower of which is oblong and much the largest; beyond are six other yellow spots forming a transverse series, three of these are close together near the costa, one in each median interspace, and one near the submedian nervure. Secondaries have one spot in each median interspace. Under surface of primaries blackish; costa and upper portion of outer margin broadly suffused with yellow; the yellow spots of the upper surface are, with the exception of the sixth, reproduced, the second to fourth each followed by a black spot, and there is a submarginal series of indistinct black spots between apex and first median nervule; a projection from the yellow marginal border passes between the costal and central spots. Expanse, 32 mm.

One male example taken at Ichang in June, and I captured one at Ningpo in April, 1886.

PAMPHILA SIMILIS, sp. n.

♂. Exactly identical with the same sex of *P. prominens*, Moore, except as regards the sexual mark, which in this species is replaced by two subhyaline spots, one fairly large and triangular, the other, just above it, smaller and comma-like.

One male example taken at Chang Yang, in June.

HALPE SUBMACULA, sp. n.

♂. Dark brown. Primaries have a double subhyaline spot in discoidal cell, one in each median interspace beyond, and three forming a short oblique dash just below costa and near apex; there are also two small obscure yellowish spots below the discoidal cell. Secondaries have three central subhyaline spots, two of these are only separated by the second median nervule, and the third is nearer the costa. Under surface dark brown, clouded with yellowish, discal central and costal subhyaline spots as above, but tinged with yellow; the costa is streaked with ochreous to the middle, and there is a submarginal series of ochreous spots extending to first median: secondaries are brown, sprinkled with ochreous scales, with a pale yellowish spot near base of costal nerve, another nearer its middle, and one at its external extremity, the last constitutes the initial spot of a submarginal series of double pale yellow spots, the third of which represents the terminal spot of three, forming a longitudinal streak from the base of the wing; another longitudinal streak below is in connection with the last spot of submarginal series, but its junction therewith is obscured by some blackish markings; fringes of both surfaces pale yellow, chequered with blackish. Expanse, 38—40 mm.

Five male specimens from Chang Yang, taken in June.

CYCLOPIDES CHINENSIS, sp. n.

Brownish black. Primaries with a short white dash near costa and towards apex, broken up by the nervules into three spots. Under surface of primaries brown, suffused with fuliginous over the discal area, upper half of outer margins bordered with greyish, white dash as above; secondaries brown, inner half thickly sprinkled with greyish scales, and traversed by two obscure darker bands. Fringes dark grey, both above and beneath. Expanse, ♂ 32—34 mm., ♀ 36—40 mm.

Several specimens of both sexes, taken in the neighbourhood

of Ichang in June and August; and one male example, captured in June at Chang Yang.

The white spots forming the costal dash vary in number from three to one; in some specimens, where three are present, they are very faint; and in others all the spots are entirely absent from both surfaces.

Allied to *C. ornatus*, Brem., but separable therefrom by the absence of the silver streak on under surface of secondaries.

CYCLOPIDES NANUS, sp. n.

Fuliginous brown. Primaries have six small yellowish spots, one discoidal, and a transverse series of five beyond, two of which occupy the median interspace, and three near costa. Fringes of secondaries and towards inner margin of primaries whitish, spotted with brownish. Under surface of primaries as above, with the addition of a broad stripe of yellowish scales along the costa, and some yellowish patches below apex: secondaries are thickly sprinkled with yellowish, especially on the basal half, which is divided into two parts by a dark transverse line just beyond a pale yellowish discoidal spot, there are central and submarginal series of pale yellow spots; fringes as above. Expanse, 21 mm.

Seven specimens, including two examples of the female, taken at Ichang in June. One of the females has the number of spots in the submarginal series on under side of primaries increased to six, by the addition of one to the costal set.

I also received specimens of this species from a native collector at Ningpo, 1886.

Distinguished from other species of the genus by its small size.

BIZONE CRUENTA, sp. n.

♂. Primaries white, with crimson markings; a short basal transverse line, united by a streak along the costa with one traversing the wing from costa to inner margin, from the upper outer edge of this last line is a longitudinal wedge-shaped spot, followed by two black dots, placed obliquely, not as in *B. hamata* one under the other; beyond the middle is a second transverse line, uniting at each extremity with a broad apical and outer-marginal border. Secondaries pale crimson, shading to white at the base. Fringes white. Under surface of primaries: central area fuscous, with two ill-defined but contiguous black spots; secondaries as above. Head and thorax pure white, collar faintly flecked with crimson.

♀. Similar to the male, but on the upper surface the markings are paler, there is no longitudinal spot before discal dots, and the border of outer margin is not united on the costa with the preceding transverse line; the lower discal spot is not always clearly defined. Expanse, ♂ 25–28 mm., ♀ 24–29 mm.

Several specimens from Chang Yang, taken in May, July, and August; one female example taken in July at Ichang.

The male of this species is without costal fold or pencil of hairs.

SATURNIA OBERTHURI, sp. n.

♂. Ground colour of all the wings deep yellow; the discal area of primaries occupied by a large salmon-pink patch, its upper limit being the third median nervule, and reaching the inner margin; a black transverse

discal bar is set in a reniform spot of a pinkish brown colour, edged internally with black; basal line black, irregularly wavy; central line, from costa to inner margin, black, and has the appearance of a series of n-marks; outer line double, wavy, commencing from the apex, where it is white; it loses itself in a large black spot, then continues in a series of symmetrical black waves to the inner margin; submarginal line white, straight; apex suffused with a pale brown cloud; basal two-thirds of costa heavily clothed with thick dark brown scales. Secondaries with the salmon-pink patch and n-like central line as in primaries; basal line curved and indistinct; double outer line wavy, black throughout; white submarginal line wavy, traversing a broad band of dull orange-brown; discal spot very similar to that on primaries, but larger, bordered all round with black, and the bar bordered externally with violet-grey scales. Head yellow, collar and front of thorax blackish brown, remainder of thorax and body golden orange. Under surface with fainter markings; legs chocolate-brown, banded with pink. Expanse, 154 mm.

One male, taken near Ichang in August.

Mr. C. Oberthur, after whom I purpose naming this species, possesses a male specimen from Cochin China.

29, Hyde Park Gate, S.W.

COLEOPTERA AT CAMBER DURING 1889.

By W. H. BENNETT.

HASTINGS and the districts around it afford some remarkably good hunting-grounds for the coleopterist. By far the best of these (as far as my experience goes) is to be found near Rye, a quaint old town of considerable interest from an archæological point of view.

Our business, however, is with the entomological features of the place. Immediately on leaving the town our hunting-ground begins. There are, at the foot of the hill on which the town stands, some miles of flat marshy land, intersected by more or less brackish ditches, the haunts of the *Octhebi*, &c.; and a mile or two off, near the mouth of the harbour, is a small range of sand-hills, similar in character to the well-known Deal sand-hills. They are not of large extent, only a mile or so in length, and very narrow. Judging, however, from the number of special sand-hill species found there we may, I think, safely conclude that at some former period they must have been much more extensive.

The following are the best species I have taken there during 1889:—*Dyschirius salinus*, plentifully, apparently associated with *Bledius unicornis* and *B. tricornis*, and also with *Heterocerus sericans*. *Dyschirius æneus* also occurred, but I could not find any *Bledii* at the same place with it. In March I took two specimens of *Masoreus wetterhallii* on moss, but could never find any more; so I suppose it is rare here. In moss, in early spring, I found *Amara bifrons* (not rare), *A. rufocincta* (one),

Harpalus rotundicollis, *anxius*, and *puncticollis*, and a single specimen of *H. cordatus*. *Acupalpus consputus* was rare by the side of a ditch, and the only Bembidiids that were worth mentioning were *B. mannerheimi* and *B. varium*. From the ditches I got *Hydroporus parallelogrammus* (plenty), *Agabus conspersus*, *Hydrobius oblongus*, *Oethebius margipallens*, *O. bicolor*, and *O. æratus* in plenty, and *O. punctatus* and *O. exaratus* rare. Under tidal refuse, on one occasion, *O. rufimarginatus* was to be found in the utmost profusion. It is curious that, although I take this species every year at Camber, I have never taken a single specimen in the water, but have invariably found them under tidal refuse from the river.

A few very good Staphylinidæ occurred. *Philonthus quisquillarius*, and var. *dimidiatus*, and *Actobius signaticornis*, under decaying vegetable matter almost in the water; *Bledius tricornis* (common but very local), *B. unicornis* ditto, *B. opacus* very sparingly. The rare *B. crassicollis*, hitherto only recorded from Deal, also turned up, but in very scanty numbers, the most determined searching only resulting in one or two specimens a day. As might have been expected, *Trogophlœii* occurred in numbers on the muddy sides of the ditches. *T. corticinus* swarmed in the spring, and *T. bilineatus* and *elongulatus* were both common. In carrion there occurred *Homalium riparium* (one), *H. fossulatum*, and *H. oxyacanthæ*; also *Aleochara algarum* and *A. obscurella* in numbers. On the sand-hills I met with *Anisotoma calcarata* and *A. dubia*; and at the same place, in dead birds, I found *Saprinus maritimus* (common), *S. metallicus*, and *S. immundus* (sparingly); also a fine series of *Nitidula 4-pustulata*, and on one occasion I beat out of the dry carcass of a dog *Cryptophagus pilosus* and *Dermestes undulatus*. Among the Byrrhidæ, *Syncalyptra hirsuta* was not rare among moss and stones, while on the banks of a ditch I got a nice series of the queer Scymnus-like *Limnichus pygmæus*. *Heterocerus obsoletus* was common, and *H. sericans* I got in numbers for the first time, but it is very local. *Helops pallidus* occurred sparingly, and deep in sand. Among the weevils I got *Metallites marginatus* (two), *Hydronomus alismatis*, *Bagous lutosus* (one), and *B. tempestivus*. This last species seems excessively local here; I found it at one ditch only, and there it occurred in dry roots of grass in the utmost profusion. Some idea of the numbers can be gathered from the fact that I counted fifty in my paper at once after shaking a few handfuls of grass. The only other species worth mentioning were *Tanysphyrus lemnae* (common), *Phytobius leucogasta*, *Baris t-album*, *Phlæophagus spadix*, and *Hyperaspis reppensis*.

I have paid no attention to the Lepidoptera, but I have no doubt many good species occur. I might mention that a few

weeks ago, in an afternoon's hunting, I got more than fifty pupæ of *Gymnancycla canella*.

11, George Street, Hastings.

AN ENTOMOLOGICAL TOUR ON THE TABLE-LAND OF MOUNT ARTHUR.

BY G. V. HUDSON, F.E.S.

(Concluded from p. 12.)

TUESDAY, January 24th, was occupied in collecting about Salisbury's Opening, round the base of Gordon's Pyramid. The sun was very hot, and nearly every tussock was enlivened by the presence of *Argyrophenga antipodum*, which is pre-eminently the butterfly of the table-land. It will be seen how widely the specimens of this insect taken here differ from those from Christchurch and the Dun Mountain, and individuals from other localities would probably exhibit further aberrations. The number of ocelli on the wings varies exceedingly; one specimen in my collection has them almost completely suppressed.

Of the large Crambi, *Crambus crenæus* is the commonest species, but is with difficulty distinguished from *C. isochylus* on the wing. *Crambus siriellus* is a finely-marked species, and a good series can be obtained with a little perseverance; but I understand from Mr. Meyrick that it is by no means confined to the alpine or subalpine regions, being found extensively on the low-lands. The brilliant little *Crambus helistes* may be seen flying about like swarms of small flies, in wet places, and is usually very common near the track. Where it leaves the forest, a fine species of *Hepialus* occurred, of which I managed to secure four specimens in all. It is said to be only a variety of *Hepialus variolaris*, a low-land insect; but I feel almost sure that it is an abundantly distinct species. Other species taken were *Arcteuthes chrysopeda*, *Notoreas paradelpha*, and a curious light form of *Chrysophanus boldenarum*, which was abundant on the shingle round the stream.

The morning of Friday, 25th, was devoted to the limestone caves, which are often rather difficult to find, but directions can be easily obtained from Mr. Heath, or the miners. In one of these a very remarkable orthopterous insect occurred. I regret to say that I was only able to obtain three male specimens. They are extremely active, and can leap two or three feet at a time; their capture is consequently attended with much difficulty in a dark cave, where one can only look about with a single candle. I much wanted to ascertain the food of these insects, but the caves seem devoid of any kind of fungoid vegetation, which I should imagine

that they would be likely to eat. No Coleoptera were observed; and in fact the only other insect was the luminous dipterous larva, which on examination proved identical with those found on the banks of streams in the forest round Wellington. In the afternoon we visited a singular gorge, chiefly remarkable for its steep sides and a large rock at the entrance, in the middle of the stream, somewhat resembling a sphinx in shape. This place is well worth visiting, and can be easily found by following down the first large stream which crosses the southern end of Salisbury's Opening. A peculiar species of *Ranunculus* was abundant on the steep sides, and many other rare looking plants. The insects taken were numerous, comprising, amongst the Geometrina,—*Larentia chionogramma*, *Cidaria purpurifera*, *Epyaxa semifissata*, *Larentia clarata*, and *Boarmia productata*. Of the Pyralidina, the genus *Scoparia* was, as might be expected, strongly represented, the following species being taken flying about the rocks: *Scoparia philerga*, *S. cymatias*, *S. trivigata*, *Xeroscopa niphospora*, *X. cyameuta*, *X. rotuella*, *Diptychophora interrupta*, *Æcophora griseata*, and many other Micro-Lepidoptera. In fact, the locality is so productive that I devoted two other afternoons to collecting there, and should strongly recommend any entomologist visiting the table-land to give it his close attention.

On Sunday, January 27th, I decided to work Mount Peel and the neighbourhood, and made an early start in the morning, arriving on the top of the mountain at about eleven o'clock. On our ascent, *Notoreas paradelpha* was common at about 4000 feet, where a black species of *Pyronota* also occurred. The first snow was met with at about 5000 feet, and shortly afterwards we again fell in with *Erebia pluto*, but not so commonly as on Mount Arthur. As, however, Mount Peel is so much better suited to collecting, a larger and finer series was taken here than on the former. I was also astonished to meet with the odd little *Chrysophanus boldenarum* up here. The butterfly is said to frequent river-beds in the South Island, but I am inclined to think that it is far more widely distributed, and have seen large numbers in the Wellington Province. A fine species of Locustidæ was also abundant on the rocks, and completely protective in its colouring; the same species occurred on Mount Arthur, and in both localities the insects were quite invisible when motionless. On returning, a visit was made to Lake Peel, where several specimens of the alpine Cicadæ (*Cicada montana*, Hud., MSS. name) were secured, as well as *Stathmonyma hectori*, and other interesting insects.

Monday, 28th, was devoted to setting specimens and collecting in the gorge; and on Tuesday we left the table-land, meeting with three specimens of *Dodonidia helmsii* on the track, all of which were unfortunately out of reach.

Perhaps a few notes on the low-land insects observed in this locality may be of some interest, as showing the range of altitude exhibited by many species. Amongst the butterflies, *Vanessa gonerilla* and *Chrysophanus salustius* were occasionally met with at about 3200 feet; they did not exhibit any noticeable divergence from the type. *Agrotis nullifera* was once taken at light, also *Scoparia diptheralis*, both being normal forms. *Crambus flexuosellus*, *Boarmia productata*, and *B. melinata* occurred occasionally from 2000 to 3500 feet, but were not very common; in all the specimens the markings were somewhat darker than usual.

Petalura carovei, the great dragonfly of New Zealand, was very abundant in swampy localities round Salisbury's Opening. I did not see any specimens above 4000 feet, while the smaller *Libellula smithii*, *Agrion colenonis*, and *A. zealandica* were swarming almost everywhere, extending up to the top of the mountain. The ordinary flesh-flies (*Calliphora quadrimaculata*, *Sarcophaga læmica*, &c.) were, as usual, everywhere. I noticed many specimens on the top of Mount Arthur, while eating my lunch. I am quite at a loss to understand what supports such large numbers of these insects in such remote localities, and can only conjecture that they are endowed with an extremely keen sense of smell, and travel great distances in search of food.

Among Coleoptera, *Pyronota festiva* was everywhere abundant, and was perhaps slightly larger and more brilliant in colouring than the ordinary form, although I think specifically identical. *Ceratognathus foveolatus* occurred under the bark of the mountain birch; but, as I have before mentioned, I did not devote sufficient time to this order to judge at all accurately of its prevalence.

An inspection of the insects taken, arranged according to the elevation at which they occurred, will, I think, at once show that as the mountains are ascended the Lepidoptera become decidedly darker in colour. This has long been observed in other countries, but I think it is interesting to be able to contribute farther evidence from New Zealand. Respecting the cause of this peculiar phenomenon, there seems to be little doubt that it is owing to the low temperature existing at high altitudes, as the same effect has been produced artificially by retarding, by means of an ice-house, the development of three species of European moths (*Selenia illustraria*, *S. illunaria*, and *S. alniaria*), of which Mr. Merrifield gives a most interesting account in the 'Transactions of the Entomological Society for 1889.' Lord Walsingham has long ago suggested that a darker colouring or melanism is advantageous to alpine or arctic insects, as it enables them to absorb the sun's rays much more rapidly than if they were of a lighter hue; and he instances, as an example, the simultaneous emergence of a white and a black insect from the pupa in a stormy and cold climate, such as we have in the alpine regions. A passing

gleam of sunshine would enable the black insect to dry its wings, fly away, and propagate its species before the white one was nearly developed, and consequently there would be a continual selection in favour of the darkest varieties. This theory, I believe, is the true explanation of the singular prevalence of melanic species at high elevations, and may of course be equally well applied to those dark varieties and species of insects which have, hitherto, been almost invariably taken in the arctic regions. That there is a marked tendency to a darker coloration in the Lepidoptera from the Mount Arthur district as we ascend in altitude, I do not think anyone can for a moment dispute, who examines the representative collection now before the Society.

For those wishing to learn further particulars in connection with this most interesting subject, I must refer them to the abstract of Lord Walsingham's paper contained in the 'Entomologist' (Entom. xviii. 81).

In conclusion, I should like to give a very striking instance of protective colouring, which I observed when on a previous visit to the Table-land in 1888. While gathering some small branches from a birch tree, I discovered a beautifully variegated larva imitating exactly the delicate hues of the lichen-covered twigs. After feeding on the birch leaves for a few days it spun up, and emerged a very grey form of *Declana roccoæ* on June 7th. I have often seen the larva of this insect, as before mentioned ('Transactions,' N.Z., p. 190, 1888), round Wellington, where, however, it does not in the least resemble the curious caterpillar found on the table-land. This circumstance, I think, gives us a hint as to the means by which alpine insects may have assumed some of their peculiarities.

In connection with my previous visit to the table-land in 1888, I should also mention that it was three weeks later in the year than in 1889, and I noticed great differences in the insects observed. For instance, in February, 1888, *Stathmonyma anceps* was very abundant; *Erebia pluto*, scarce; *Rhyssa antipodum*, one taken and three or four seen; *Cladopais mirus*, very common. In January, 1889, I found *S. anceps* was rare, *E. pluto* very abundant, and of *R. antipodum* and *C. mirus* I neither saw or captured a single specimen. This shows that there is a rapid succession of insect life on the mountains, which can only be properly studied by numerous and prolonged visits of entomologists.

Wellington, New Zealand.

ON THE OCCURRENCE OF *HESPERIA LINEOLA*
IN ESSEX.

BY A. J. SPILLER.

THE discovery of *Hesperia lineola* as a new British butterfly is an event of great interest to all entomologists, and in this case there is every reason to believe that the insect, although probably confined to one or two counties, will be found pretty plentiful where it does occur.

During my residence in Essex in 1885-8, I frequently came across the species referred to. In 1885 *Colias edusa* appeared sparingly in clover fields, and to obtain a series I spent many August mornings among the fragrant clover blossoms. Here I first noticed *H. lineola*, and although I suspected at first that my captures might be this species, yet their seeming abundance, and the fact that they flew with ordinary *H. thaumas*, led me to disregard this theory, and to accept as a solution of the problem that they were a local variety, due probably to their occurrence upon a chalky soil. In 1887, which was an exceedingly hot summer, the Pieridæ appeared in vast numbers in the clover-fields, and, expecting from the great heat that *C. hyale* or *C. edusa* would appear, I again assiduously searched the clover flowers. Neither *C. hyale* nor *C. edusa* appeared, but *H. thaumas* and *H. lineola* did, and in numbers that rivalled the "whites," nearly every field in one district producing these "skippers" in abundance. Still considering *H. lineola* to be but a local variety of *H. thaumas*, I did not capture the large numbers I might have taken, but after netting them simply selected those specimens which had the black bar least developed, in the hope of obtaining extreme varieties. I was particularly anxious to obtain males in which the black bars were altogether wanting, and consequently netted large numbers, letting those go which did not come up to my expectation of what a variety ought to be. The species was also plentiful in 1888.

I have now thoroughly overhauled the specimens in my cabinet, and find that I possess sixteen *H. lineola* in my series of *H. thaumas*. In order that no doubt may exist upon the matter, I have forwarded a pair to the Editor of the 'Entomologist' for identification. [The specimens are certainly referable to *H. lineola*.—ED.]

How long this butterfly has existed in Essex is a question I feel unable to determine. But I resided in 1874-6 at Stanstead in that county, and although in several of my entomological peregrinations I collected within a couple of miles of the spot where I recently found it so plentiful, yet I never met with *H. lineola* there.

I may say that although its head-quarters in my district were

a few miles from my late residence, yet I was in the habit of meeting with this form all around the neighbourhood,—sometimes in clover-fields, sometimes settled on flowers in corn-fields, and occasionally flying in grassy lanes. The time for its appearance would be the latter half of July and the beginning of August.

Butterflies, as a rule, are scarce in that part of Essex. In 1875 *Colias edusa* and *C. hyale* occurred plentifully, but *Vanessa polychloros* is the only local species I have found in fair numbers. *Leucophasia sinapis* occasionally occurs singly, likewise *Thecla w-album* and *L. argiolus*; and in 1887 *T. quercus* more frequently. The common skippers, *S. alveolus* and *T. tages*, are very local but fairly abundant; but *H. sylvanus* is met with everywhere with *H. thaumas*. The only fritillary I met with during four seasons was a single wandering *A. paphia*, in a country lane,—most probably a rambler from some distant wood. Even such a common species as *L. egeria* seems to be non-existent. Butterflies being thus comparatively scarce was probably the reason why I paid so much attention to what I then considered to be a local form of *H. thaumas*, but which I now know to be *H. lineola*.

Chinnor, Oxon, January 10, 1890.

Hesperia lineola, a description of which is given by Mr. Hawes (Entom. 3), occurs in abundance, the first week in July, on the marshes near Purfleet, Shoeburyness. I possess five specimens only, but could, had I been disposed, have taken many scores last year. — F. G. WHITTLE; 2, Cambridge Terrace, Lupus Street, S.W.

RHOPALOCERA IN SWITZERLAND.

By R. S. STANDEN, F.E.S.

On my return to England, after an absence of six years on the Continent, I have been surprised and disappointed to find how strong a hold exclusive British Entomology still has upon the average collector. It is natural enough that we should treasure and make the most of insects that are unknown elsewhere, but how extremely limited is the list of them. The British Isles, as was remarked once by Mr. Bates, are but a "half-starved fragment" of the great palæarctic realm, and it seems to me that to limit one's researches to a small corner of a large area is to take an extremely narrow view of an important science.

In these days of cheap locomotion, too, it is hard to understand why the young student, who has long since exhausted his observations—for example, on the British butterfly—should not

burn to know something of its much more numerous congeners on the other side of the Channel. When one thinks that in little more than twenty-four hours one can reach the best collecting-ground in the South of France or the Swiss Alps, where in one day an active man may secure more species than the whole summer through in England, it seems strange that insular predilections should still so largely prevail. And what proper estimate, for instance, can we form here of the true characteristics of that alpine genus *Erebia*, with its meagre quotient of two, as compared with thirty distinct species and a vast number of varieties on the Continent of Europe alone? Or of our ten *Lycænidae* against fifty or more on the Continent?

For the benefit of those who are unfamiliar with the aspect of a Swiss Valley, from the lepidopterist's point of view, in the month of July, I may be allowed, perhaps, to recall a stroll up one of them, net in hand, on a warm day towards the end of that month. For most species the end of July is late, at the lower end of a valley, but there is often consolation higher up, where species that were ragged 2000 ft. below have here only just emerged. Where all are so beautiful and so prolific in insect-life, it is difficult to make a selection; but the one of which I have the most grateful recollections is the Visper-Thal, off the Valley of the Rhone. A friend and I explored it together in July, 1885. From Visp to Stalden is an easy walk of two hours along a pretty valley, where the vine is still in cultivation; a noisy stream rushes over its rocky bed beneath you, and the snowy peak of the Balfrein blocks out all further view ahead. The only rarity I met with here was a single specimen, much worn, of the var. *lycidas* of *L. zephyrus*. Until a year or two previously, Berisal, on the Simplon, was the only locality for this insect. I took two females of it also on the Gemmi in 1886. This is one instance among many of the fact before referred to, viz., that, other conditions being favourable, the same insect may be found at widely varying altitudes, a difference in this particular case of some 4000 ft.

We stayed the night at Stalden, a most picturesque old village at the junction of the Saas and Zermatt valleys. At 6 o'clock the next morning we set out for Saas-im-Grund (5000 ft.), a three hours' walk, but expanded by us into nearly five, by reason of the many snares which beset our path—notably on approaching our destination, when the sun had full possession of the narrow valley, and species new to us were occurring at every step—the most abundant being *Polyommatus virgaureæ*, flitting dazzlingly among patches of its namesake, the golden-rod, and *Erebia tyndarus* and *goante* scattered generally over the meadows. We spent five days at Saas, working each day in different directions; but the most remunerative in species was one on which we walked up to Mattmark Lake (7000 ft.).

In the immediate neighbourhood of the Saas Hôtel five interesting members of the Lycænidæ occur, *viz.*, *optilete*, *pheretes*, *orbitulus*, *eros*, and *donzelii*, the deep violet of the first and the silvery grey of the last three being particularly striking when seen for the first time. A little further on a group of fritillaries enliven the scene—*Melitæa maturna*, *phœbe*, *aurelia*, *dictynna*; *Argynnis niobe*, with its var. *eris*, *A. pales*, and var. *napæa*. *Parnassius apollo* also occurs here pretty abundantly; and a little higher up, where the valley narrows, we took quite a modest series of *P. delius*, hovering gracefully along the margin of the stream, where they appear to suck the flowers of *Saxifraga aizoides*, on which also the larvæ are said to feed. Here the scenery begins to grow wilder; huge masses of rock shoot up above the larch, spruce, and birch, with which the slopes are still clothed, the boulders in the river are mightier, and there is a weird feeling of desolation ahead. We are now over 6000 ft. above sea-level, and the alpine Erebias are at hand—*mnestra*, *evias*, *gorge*, *euryale*. On a barren slope, just before reaching the lake, I took a worn specimen of the very local *Æneis ællo*, abundant some years on the Simplon.

The approach to the Mattmarksee is almost diabolical in its savage grandeur. A few scattered bushes of the alpine rose and a little brushwood are the only signs of vegetation; the narrow pass is choked with rocks and stones, and the Allalein Glacier forms a natural dam between the lake and the valley. From out of it rise colossal pyramids of cleft ice sheer against the sky, and from an ice grotto at the lower end issues the River Visp. In this wild spot, on a towering slope of loose shale—with not a particle of vegetation visible, and where a false step meant broken bones, if not something worse—*E. glacialis* was quite abundant, with an occasional var. *alecto*. But collecting under these conditions is too exciting to be agreeable, and we soon clambered over the little rocky pass down to the shore of the muddy lake, where a stunted kind of vegetation again appeared, and where we again came across a few specimens of *Lycæna pheretes*, *orbitulus*, and *eros*, in much finer condition than those we took 2000 ft. lower down. *Erebia lappona* was also common and fine at this spot.

There is a small inn here, where fair accommodation and Italian wines may be had. At Saas-im-Grund also is a capital hostelry—the Hôtel du Monte Moro—where board and lodging are only 5s. per diem; so that a fortnight's excursion to this valley from England may be accomplished easily and comfortably for from ten to twelve pounds.

I append a list of Rhopalocera, observed or taken, between Visp and Mattmark, in the third week of July, and shall be glad to give information about other valleys and hotels to any one desiring it.

The language of the Canton Vallais, where Visp lies, is German, but as it adjoins a French canton many of the people speak that language also. Kane's 'Handbook of European Butterflies' will be found a most useful *vade mecum*.

List referred to above. — *P. podalirius*, *machaon*, *P. apollo*, *delius*, *P. brassicae*, *rapae*, *napi* var. *bryoniae*, *callidice*; *L. sinapis*; *C. phicomone*; *P. virgaureae* var. *zermattensis*, *hippotoë* var. *eurybia*, *alciphron*, var. *gordius*; *L. ægon*, *argus*, *optilete*, *zephyrus* var. *lycidas*, *pheretes*, *orbitulus*, *astrarche*, *eros*, *icarus*, *eumedon*, *escheri*, *donzelii*, *minima*, *semiargus*, *arion*, var. *obscura*; *V. urticae*, *io*; *M. maturna*, *aurinia* var. *merope*, *phœbe*, *didyma*, var. *alpina*, *dictynna*, *athalia*, *parthenie*; *A. euphrosyne*, *pales*, var. *napæa*, *latonia*, *niobe*, var. *eris*, *paphia*, var. *valesina*; *M. galatea*; *E. epiphron* var. *nelamus*, *melampus*, *mnestra*, *ceto*, *evias*, *glacialis*, var. *alecto*, *lappona*, *tyndarus*, *gorge*, *goante*, *æthiops*, *euryale*; *Æ. aëlo*; *S. hermione*; *P. mœra*; *E. ianira*, *lycaon*, *hyperanthus*; *C. satyrion*, *pamphilus*; *S. carthami*, *alveus*; *N. tages*; *H. thaumas*, *lineola*, *sylvanus*, *comma*.

Framingham Earl Hall, Norwich, December, 1889.

ON THE VARIATION OF *HELIOPHOBUS HISPIDUS* AT PORTLAND.

By N. M. RICHARDSON, B.A.

I think that I can give an explanation of the confusion that has arisen with regard to the violet tinge of *Heliohobus hispidus* at Portland. I sent to Mr. Tutt on Oct. 1st, 1888, specimens taken during September, and on Oct. 15th answered a letter of his asking about the violet tinge. It is probably a part of this letter that he quotes (Entom. xxii. 136), and so far as I remember I had not at that time noticed any distinct violet tinge.

This year I found that many specimens, when alive and for some time after death, were distinctly tinged with violet, or perhaps more accurately pinkish-lilac, but that after a few weeks this tinge entirely disappeared. At the present time, though I kept for myself several strongly tinged specimens, I cannot find a trace of this violet tinge in any of them.

Hübner therefore probably figured the moth alive or when very recently killed. I could not, however, say of any of the Portland specimens, even during life, that their "pale markings were of a delicate violet"; on the contrary, they are very pale ochreous, some of them being almost white: the violet is nothing more than a tinge, far less intense than the pink colour of a fresh specimen of *Xylocampa lithoriza*, and is, as I have said above, very evanescent. It is spread over the whole of the fore wings, but is most striking on the hind margin and fringes.

With regard to the varieties of *H. hispidus* found at Portland, I wish, in the first place, to correct the apparent meaning of a quotation which Mr. Tutt makes from a letter of mine (Entom. xxii. 137), "This (var. *pallida*) is a more common var. and very pretty." As he does not give the context, it would appear that I meant "more common" than his var. *argentea* (which represents, I suppose, the commonest form at Portland), whereas I have little doubt that I referred to a very small (1 in. 2 lines) and dark var. (his var. *obsoleta*?), of which I have only taken two specimens, one a good specimen of the extreme form, and one a bad specimen somewhat resembling it, which is the one I sent to Mr. Tutt. I have seen no others just like these two specimens, which differ from the ordinary form in being smaller, darker, and having less distinct though similar markings. All the other Portland specimens that I have seen resemble each other in the general style of their markings and in size (about 1 in. 5 lines), but vary a good deal in the shade of their ground colour, from very pale greyish brown to almost black. There is, as Mr. South says (Entom. xxii. 282), very little variation in the arrangement of the markings.

Between these two extremes there is every intermediate form, and it would be impossible to make any line of division, as a graduated series could be arranged in which the differences between consecutive specimens would be almost imperceptible. The bulk of the specimens are neither very dark nor very light, but the very light ones are commoner than the very dark ones. I have seen nothing that can be called a variety amongst the females; they vary a little in size, but are far more constant in shade of ground colour than the males, and never very light or very dark; they are much less handsome than the males, and of a less graceful shape.

I do not possess any Torquay specimens, so cannot unfortunately compare them with those from Portland.

Montevideo, near Weymouth, Dec. 21st, 1889.

GAS-LAMP ENTOMOLOGY.

BY J. ARKLE.

WHY a moth should rush to a street-lamp, and decline to waste its energies in a straight course for the moon,—why, in other words, the insect should be attracted by artificial light, and shun that which is natural,—is a matter that has exercised the minds of philosophers, ancient and modern. Between the moral drawn from the question by the early Greek, and the speculation of the latter-day scientist, one thing to the entomologist is certain, that by taking moths "at light" he can add captures to

his collection which otherwise he might seldom, if ever, make. Among the methods of taking moths at light, these observations will be confined to the working of gas-lamps, to a method followed by me for years, and, lastly, with reference to captures made personally, with the exception of a solitary insect.

Perhaps our best hunting-ground here is a lonely road about half a mile south of the city. Along one side stretches a plantation of miscellaneous trees and undergrowth, chiefly oak; on the other is a footway, with lamps two hundred yards apart. Beyond this open fields stretch away into the country. A hawthorn hedge bounds the road on either side.

I rarely take a net, my only apparatus being a cyanide bottle—the cyanide (of potassium) being covered by a layer of cotton-wool—and a twelve-foot ladder, taken close by a few silent friends from a neighbouring graveyard. The bottle is an ordinary pomade-bottle; it fits the waistcoat-pocket, and so, with the aid of the cotton-wool, prevents the insects from rolling about. The ladder I prefer to all other appliances, because the outside, inside, and framework of the lamps can be examined. Again, the use of the ladder enables the entomologist to work with little interruption, the collector being taken as a rule for a “gas-man.” Nevertheless, the night is sometimes varied by incidents more or less amusing. You become “a character well-known to the police”; nay, it is likely enough that the stalwart officer on the beat, in spiked helmet and greatcoat, may assist in “running in”—to the cyanide bottle—a refractory insect.

Many moths, not even singed by the flame, rest inside the lamps; many of course on the glass outside; but others, such as *Pæcilocampa populi* and *Asteroscopus sphinx (cassinea)*, lie close to the framework inside, outside, and under the lamp, so that they are invisible to a spectator on the footway. Again, a female, finding herself imprisoned, will often deposit her eggs in the lamp, or she may be captured, taken home, and made use of for breeding purposes. All this can be best effected by means of a ladder. I have carried mine, to be modest, one hundred miles. It is well to have in one's pocket two or three chip-boxes to accommodate eggs or females. My only companion, in nine cases out of ten, is a trusted stick.

All moths are not equally attracted by the lamps. I never took a single hawk-moth, or a *Tæniocampa*, although the latter might be swarming on the sallows near. *P. populi* comes well to lamps; not so *Eriogaster lanestris*, its near relative. Up to 1889 I had only one record of *Plusia gamma*, when in that year the insect changed its character and became a nuisance. I never took a *Dicranura vinula*. But my experience goes to show that the great majority of moths, males chiefly, come to lamps, and more especially the Geometers. Among the latter, *Hybernia*,

Cidaria, and the "Thorns" are especially conspicuous. *Arctia caia*, *Spilosoma lubricipeda*, and *S. menthastri* are always certain to come in their season by the dozen. I helped an *A. caia* one night no less than three times out of my net, and over the hedge, until it returned a fourth time and fell a victim to a bat. *A. fuliginosa* I never even saw. *Hepialus humuli* rarely allows itself to be trapped, although dancing over the grass by the dozen; and *H. lupulinus* never, though equally common.

The best nights for lamp-hunting are those that are warm, dark, and still. Insects are very sensitive to temperature, therefore a thermometer below 50° F., marks a paucity of sport. Few moths, if any, will be abroad in moon or starlight. A strong wind is equally unfavourable. If the weather-vane points at all to the east, the entomologist may certainly rest indoors.

I have always observed two chief flights of moths in a night. With the dusk appear the Geometers; these are afterwards followed by the Noctuas; and this flight goes on till eight o'clock. After an apparent rest of a couple of hours, the second flight begins at ten, with diminished Geometers but increased Noctuas, and continues till midnight. The entomologist may then turn in and empty his cyanide bottle. He should have in readiness a large wide-mouthed pickle bottle, half-filled with chopped and bruised laurel leaves. On the top of the leaves, which should be well pressed down, a piece of perforated card should be placed, and fitting the bottle. On this the insects may be laid, when they will remain perfectly natural and relaxed for a week or more. Moths of a green colour, like the Emeralds, should be set at once; in fact, they should be removed from the cyanide bottle as soon as killed, pinned into a pocket-box, and set on reaching home. This is the secret in preserving the exquisite tint of an insect like *Geometra papilionaria*.

The entomologist at the top of his ladder on a favourable night looks into a veritable insect world. Thousands of gnats, many in their last struggles for existence, cover the bottom of the lamp. These gnats, when seen on the wing at the approach of dusk, are sure harbingers of successful sport. If it be the month of August, half a dozen Noctuas may be inside, sullen and quiet. A beetle or two, with numerous earwigs and three or four Geometers, swell the company. Some of the lepidopterous insects are scorched by the flame, but the greater proportion are fit for the cabinet. The whitish eggs on the glass inside are probably those of *Luperina cespitis*. Outside there will be more earwigs, a *G. papilionaria* if birches are in the neighbourhood, Noctuas, more Geometers; and all these, as a rule, will be as fresh as if straight from the chrysalis. Spiders are feasting busily on the dying gnats, and a bat flies up and down and about, taking, the meanwhile, a liberal tithe. The great pest

to the collector is a red ichneumon; a friend labels it, with a query, *Ophion*. This insect is a little larger than a wasp, and possesses a sharp and down-curved sting or ovipositor, which it can use in a very unpleasant manner. I have often small lumps the size of a pea, and more, raised on the back of my hands by these creatures, although the pain is by no means equal to the sting of a wasp or bee. The ichneumon gets into the lamps, or buzzes outside by the dozen, and seems to angrily resent all intrusion. The whole scene reminds one of the early Greek and his moral, viz., that these seductive lights are as fatal to the insect tribes as the sinful pleasures of this world are to women and to men. I will now append a list of Chester captures. Those marked with an asterisk are rare:—

JANUARY.—*Cheimatobia brumata*, *Hybernia defoliaria*, *Phigalia pedaria*, (*pilosaria*).

FEBRUARY. — *H. rupicapra*, *H. marginaria* (*progemmaria*), *P. pedaria*.

MARCH.—*Selenia bilunaria* (*illunaria*), *P. pedaria*, *Anticlea badiata*, *Anisopteryx æscularia*, *H. rupicapra*, *H. marginaria*, *Eupithecia abbreviata*.

APRIL.—*S. bilunaria*, *H. marginaria*, *A. æscularia*, *A. badiata*, *Triphosa dubitata*.

MAY.—*S. bilunaria*, *A. badiata*, *Melanippe fluctuata*, *Cidaria suffumata*.

JUNE. — *A. badiata*, *Coremia unidentaria*, *Melanippe montanata*, *M. fluctuata*, *Timandra amatoria*, *Campptogramma bilineata*, *Cabera pusaria*, *Acidalia aversata* with var. *remutata*, *Rumia luteolata* (*cratægata*), *Caradrina quadripunctata* (*cubicularis*), *Arctia menthastri*, *A. lubricipeda*, *Triphæna pronuba*, *Agrotis exclamationis*, *A. segetum*, *Leucania comma*, *Scopula olivalis*.

JULY. — *Phorodesma pustulata** (*bajularia*), by Mr. J. Lyon Denson, Chester; *Uropteryx sambucaria*, *A. aversata* with var., *A. inornata*, *C. exanthemata*, *Geometra papilionaria*, *Abraxas grossulariata*, *S. illunaria* var. *juliania*, *Cidaria fulvata*, *Metrocampa margaritaria*, *Iodis lactearia*, *Campptogramma bilineata*, *Phibalapteryx vittata* (*lignata*), *Arctia caia*, *Liparis similis* (*auriflua*), *L. pallens*, *L. conigera**, *Noctua augur**, *N. plecta*, *Mamestra brassicæ*, *M. anceps**, *Xylophasia monoglypha* (*polyodon*), *Grammesia trigrammica** var. *bilinea*, *C. morpheus*, *C. alsines**, *Luperina cespitis*, *Plusia gamma*, *P. iota**, *Hepialis humuli* (?), *Ebulea sambucalis*, *Perinephele lancealis*, *Edematophorus lithodactylus*, *Scopula prunalis*, *S. lutealis*, *Zanclognatha tarsipennalis*, *Diurnea fagella*, *Lemnatophila phryganeella*, *Tortrix viburnana*, *T. rosana*, *Teras contaminana*, *Platyptilia gonodactyla*, *Crambus tristellus*.

AUGUST.—*G. papilionaria*, *Pseudoterpna pruinata* (*cytisaria*), *Hypsipetes sordidata* (*elutata*), the dark form; *A. grossulariata*, *Epione apiciaria*, *Crocallis elinguaris*, *Eugonia alniaria* (*tiliaria*), *Cidaria truncata* (*russata*), *Coremia unidentaria*, *C. designata* (*propugnata*), *M. fluctuata*, *C. pusaria*, *Eubolia limitata* (*mensuraria*), *E. cervinata*, *Boarmia repandata*, *T. dubitata*, *C. aversata*, *S. illunaria* var. *juliania*, *Halia vaularia* (*wavaria*), *Neuronia popularis*, *L. testacea*, *Noctua rubi*, *L. cespitis*, *L. pallens*, *A. caia*, *Ancho-celis lunosa*, *Orthosia lota*, *Calymnia pyralina**, *C. trapezina*, *Bryophilu perla*

(a very diminutive form), *Triphæna ianthina*, *T. orbona*, *T. pronuba*, *P. gamma*, *Cænobia rufa*, *L. guenéei*,* *Rhacodia caudana*, *Conchylis straminea*, *Scoparia truncicolella*, *Tortricodes hyemana*, *Paraponyx stratiotalis*, *Botys ruralis (verticalis)*.

SEPTEMBER.—*E. alniaria*; *C. truncata*, vars. *centum-notata*, *comma-notata*, *perfuscata*; *C. immanata* and var. *marmorata*,* *M. fluctuata*, *E. apiciaria*, *C. testata*, *Hydræcia micacea*, *A. pistacina*, *A. lunosa*, *Xanthia fulvago (cerago)*, *X. flavago*, *X. citrigo*, *Nonagria arundinis (typhæ)*, *Cirrhædia xerampelina*,* *Amphipyra tragopogonis*, *L. similis*.

OCTOBER.—*Oporabia dilutata*, *Himera pennaria*, *C. miata*,* *A. pistacina*, *Diloba cæruleocephala*, *Hydræcia nictitans*, *Scopelosoma satellitia*, *O. lota*.

NOVEMBER.—*O. dilutata*, *H. pennaria*, *C. miata*,* *Hybernia defoliaria* (four well-marked forms), *C. brumata*, *O. lota*, *O. macilenta*, *Pæcilocampa populi*, *D. cæruleocephala*, *Xylina ornithopus (rhizolitha)*,* *S. satellitia*, *Asteroscopus sphinx** (*cassinea*).

DECEMBER.—*C. brumata*, *H. defoliaria*, *S. satellitia*, *P. populi*.

2, George Street, Chester.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

ON THE NEED OF THE REVIVAL OF THE 'ENTOMOLOGISTS' ANNUAL' — In a short notice of vols. ix. and x. of the 'Proceedings of the Dorset Natural History and Antiquarian Field Club' (Entom. 24), a remark is made on the need of the collation and indexing of the proceedings of the various local and metropolitan scientific clubs or societies. This undeniable want appears to me to have been, practically, the very one so ably met for many years by Mr. Stainton and others, in the 'Entomologist's Annual,' which has now been defunct for sixteen years. Would it not be practicable for a conclave of our working entomologists to collate the various papers and notes published in the different journals since the 'Annual' disappeared, and publish the results, with such plates as could be afforded; and then to continue the work year by year? It can hardly be doubted but that subscriptions or contributions would be obtainable to supplement the deficit, if any, of the funds needed to bring out such a work: that is, supposing the sale by itself did not suffice. I have never, myself, ceased to regret the disappearance of that prime necessary to working entomologists, the annual yellow volume; and I feel sure a very large number of us would gladly aid in its resuscitation. Will not some of our leading entomologists move in the matter?—(Rev.) O. P. CAMBRIDGE; Bloxworth Rectory, January 11, 1890.

HESPERIA LINEOLA, Ochs.—In his record (Entom. 3), of the interesting discovery of *Hesperia lineola* as a British butterfly, Mr. F. W. Hawes seems to indicate that there is some divergence of opinion as to the specific distinctness of *H. lineola* and *H. thummas*. Besides the rather slight but constant colour differences, there are also structural differences between the two species. These are shown in the genital armature of the males. It is impossible to give in words a good idea of this structure, but in the 'Transactions' of the Linnean Society, Second Series, Zoology, vol. i., pl. lvii. figs. 26 and 27, will be found illustrations of the parts.—F. BUCHANAN WHITE.

NOTE ON *CIDARIA IMMANATA* FROM ICELAND.—After careful examination of the specimens of *Cidaria* that I captured in Iceland during July and August, 1889, Mr. South arrived at the conclusion that all are referable to *Cidaria immanata*, and none to the closely allied *C. truncata (russata)*. By far the larger proportion of the specimens of *C. immanata* were taken at Arnefjord, Dyrafjord, and Onundafjord, on the west coast of Iceland, July 30th and 31st, and the greater number belong either to the dark typical form, or to the reddish one so common at Rannoch. The Rannoch form, so far as my observation went, is, on the whole, the most abundant, though typical *C. immanata* is widely distributed, occurring at Saudarkrok and Akureyri on the north, and Eskefjord on the east coast. I only captured five specimens of *C. immanata* at Reykjavik, and these were all of the Rannoch form. Its comparative scarcity in the neighbourhood of the capital may be attributed to the fact that it was then (July 26th), only beginning to emerge from the chrysalis. Its scarcity at Isafjord, on the west coast, and at all the fjords on the north and east coasts (after it had appeared in plenty elsewhere), can hardly be assigned to the supposition of its disappearance at so early a date as the first week of August; it is far more reasonable to suppose that the higher latitude of some districts, and the more Alpine character of other regions, or both causes combined, account for its absence or scanty appearance. It is perfectly true, that as I landed at thirteen fjords where no previous visit of any entomologist has been recorded, to my knowledge, I had no means of knowing the best locality for insects during the one or two hours or one day that I was enabled to spend there; but, on the other hand, it must be borne in mind that at certain of these fjords above-mentioned Geometridæ were easily discovered, occurred in plenty, and very near the landing-place, and also that my experience of the rarity of moths at Siglufjord tallies with that of Finsterwalden in 1856, this being the only place adjacent to the Arctic Ocean that was similarly surveyed by the German Expedition of that year. Var. *marmorata*, among the Iceland specimens, is somewhat sparingly represented. Of the form of *marmorata* in which the reddish tint is suffused over the whole of the fore wings, instead of being confined to the base and extremities, as in the ordinary type of this var., there are only two specimens, and these are from Dyrafjord. There is also one specimen of "*pythonissata*" of Millièrè, from Arnefjord. As regards Icelandic varieties, I took two specimens of this moth, shortly before leaving Reykjavik, that I named "*ejornensis*," as found in the sloping meadows above "*ejorn*," or the lake in rear of the cathedral, but which I found to have been previously discovered by Staudinger, and by him named "*thingvallata*," from Thingvellir, the place of its capture. The name *ejornensis* may, however, possibly be allowed to stand, in reference to an intermediate form between the ordinary *marmorata* and the *thingvallata* of Staudinger, of which I also took two specimens, one above the *ejorn* or lake, and the other a few days later, at Dyrafjord. It is remarkable that this last var. exactly corresponds to one in Mr. South's collection, taken at York.—(Rev.) F. A. WALKER, D.D.

SUGARING. — My own experience quite agrees with all that has been written recently, respecting the comparative failure of sugar in attracting Lepidoptera. I think the subject of interest, and should like to see the opinions of experienced collectors as to the cause of this unproductiveness, which has been noticed by so many. Somewhat indifferent health has

necessitated my confining my sugaring-grounds to the trees surrounding our house, and in our own neighbour's garden. There is a tolerably good variety, comprising elm, lime, poplar, willow (*Salix alba*), with hedges of hawthorn and blackthorn. In some years my sugar-patches rendered a good return of moths, my captures numbering about fifty different species. Now, for three or four years past, night after night, sugaring has been almost of no avail. Can it be a case of inherited instinct? and are the rising generations of moths getting too wise to be trapped by the sugaring baits? The evolutionists tell us many wonderful stories; can they help us to arrive at some conclusion in this instance? Why is it that certain species of Lepidoptera are so rare? Is it to be attributed to the female laying but a limited number of eggs, to a delicate constitution in the larva and pupa, to more than ordinarily persistent attacks from ichneumon flies and other enemies, or, more probably, from a want of knowledge of the habits of these species? In the year 1878 I had the good fortune to capture at sugar the specimen of *Leucania albipuncta* mentioned in my list. The late Mr. Buckler was very anxious to obtain ova, and asked me to do my best in procuring some for him. In company with a friend, I have yearly made a strict search in hope of finding another, but without success. Again, in the case of *Laphygma exigua*, taken here in a clover-field by my brother last year; although we tramped the same field day after day, over and over again, both last year and this, not another was to be seen. It is easier to understand why some insects should be *local*; this may arise from the food-plants being confined to definite areas; but why a moth, capable, I should suppose, of by no means a long-sustained flight, such as these two species, should turn up only here and there singly, remains to me inexplicable. We cannot, I think, conceive that these, like the swift and strong-winged Sphingidæ, which perhaps often are so, are immigrants from distant lands; there can be little doubt of their being "true-born Britons"; and it seems to me likely that many species are rare, mainly on account of some particular and curious habit of concealment of which we are not cognisant.—JOSEPH ANDERSON, Jun.; Chichester.

Sugaring seems to have been rather a failure this season in most places; but in South Devon, where I was staying early in September, I found it by no means unproductive. Some twelve common species of Noctuæ were abundant, while a few specimens turned up of *Noctua glareosa*, &c., and one each of *Thyatira batis*, *Hydræcia micacea*, *Noctua umbrosa*, and *Luperina cespitis*. A few common Geometridæ, such as *Cidaria truncata* and *Larentia viridaria*, also came to the sugared patches. All these were taken from six or eight trees skirting the north-west side of a wood. The moon was shining during each of the six nights that I sugared, which were for the most part cloudless.—R. M. PRIDEAUX; 9, Vyvyan Terrace, Clifton, Bristol.

FORCING PUPE OF *D. GALII*.—In the 'Entomologist,' xxii. p. 202, I read the words, "By all means force your *galii* pupæ." Not being the fortunate possessor of *galii* in pupæ at the time, I obtained three, as much for the experiment as otherwise. I commenced forcing under the directions given by Mr. J. Arkle, placing my pupæ under a glass, beneath which I placed a small thermometer, keeping the whole near a fire. The highest temperature reached 120° Fahr., the lowest 40°. I placed my three pupæ beneath the glass on Nov. 11th, and on Dec. 15th the first emergence took place, the second on the 26th, the third on the 30th of the

same month. Free and frequent damping with tepid water is one of the most essential things connected with forcing pupæ. I am of opinion dryness is far more fatal than heat. — T. WALPOLE; 9, Dudley Terrace, New Somerby, Grantham, January 6, 1890.

LEPIDOPTERA IN 1889.—

New Forest.—On July 15th last I arrived at Brockenhurst to spend the two succeeding days collecting Lepidoptera. The following were among my observations:—*Apatura iris*: I captured a fine female, the only one I saw during my short stay. It was resting with outspread wings upon the wet ground in the shade, undoubtedly beaten from the oaken foliage overhead by the torrents of rain that fell during the night and early morning; it being still quite early in the day when I found it. *Limenitis sibylla* was fairly plentiful, but mostly in worn condition. *Argynnis paphia*, plentiful and in very fine condition: I took one male with a pale yellow spot on each of the primaries, and a female with two straw-coloured spots on each primary; I secured ten of the var. *valesina*, all except one being in the finest condition; eight of these I took on the 17th. Considering *A. paphia* was not so abundant as usual, *valesina* was out in large proportion. In a low-lying part of the Forest, where the wild gladiolus grows, many species of Diptera swarm, such as the great *Tabanus bovinus*, and the tormenting blood-drinking *Hæmatopota pluvialis*, whose bite is only too well known. In this particular spot I noticed *A. paphia*, especially the females, were all in the most perfect condition and in great numbers; it was here, too, where I found the beautiful *Calopteryx virgo*. *Argynnis aglaia* I found very abundant on a rough grassy opening, settling on the thistle bloom. I took a fine series (but mostly males) in a few minutes. *A. adippe* appeared very scarce; I noticed only two or three, and they were much worn. *Lycæna ægon* was out in abundance; some of the males were of large size. *Satyrus semele* I found just out on the wing; males in plenty, but one female only. *Lithosia quadra*: I took but one specimen, a female, at rest on the trunk of the knight-wood oak. *Vanessa polychloros*: not one specimen seen, and I heard of none being taken this year in the Forest. It is now many years since I had the pleasure of taking this fine insect; in the years of 1872-3 it absolutely swarmed in South Suffolk, since which time I have taken but one solitary specimen, and this was at rest on palings in the Croydon district in 1874.—F. W. FROHAWK; October, 1889.

Rotherham.—In this district the year 1889 opened with cold winds and much wet, the insects usually appearing in February and March being much behind time, and the season did not fairly commence before April. Larvæ searching during April was not a success as compared with 1888, when the abundance of several species was remarkable, although *T. fimbria* was fairly plentiful if well searched for on the docks and low herbage. At the end of April and first week in May the willows were in bloom, and I found plenty of work, insects being abundant; but owing to the difficulty of getting at the willows, many of them being in the thick brush, a patch of trees were sugared in the hope that we might be fortunate in taking a few stragglers. I was very agreeably surprised to find that, notwithstanding the close proximity of the willows, a number of Tæniocampidæ visited the sugar, including *P. leucographa*, *P. rubricosa*, *T. munda*, and *T. populeti*, as well as other insects, hibernated *S. satellitia* and *C. vaccinii* being very abundant. During the first half of May very few visits to the woods were made, the weather being wet and cold, and towards the latter end of the

month there was a very heavy thunderstorm, accompanied with hail, which had the effect of beating a great number of larvæ from the trees, — some never to get up again: this was plainly evident in the case of *T. w-album*, for when we worked the elms, on several occasions in vain, a few pupæ only were taken from the low bushes and ground herbage later on. During June sugaring was persistently carried on two and three times weekly, with results almost *nil*; from the 9th of the month to well into July no rain fell; the nights were remarkably still with heavy dew; no insects came to sugar, although plenty were flying; the low bushes and ground herbage were covered with a sweet sticky substance, which proved a successful counter attraction to our sweets. Larva beating was usually carried on after the sugaring, commencing just before daybreak, and, to make up for disappointment in the matter of imagoes, larvæ were fairly plentiful,—that of *C. flavicornis*, though difficult to beat during the daytime, now comes down quite easily; in addition to that insect *B. parthenias* was plentiful; a few *G. papilionaria*; also *P. populi*, *N. hispidaria*, and *C. paleacea* (*fulvago*). Both these last are new to the district, the latter especially so, as I am assured by an eminent Yorkshire entomologist that before it turned up here in 1888 only two specimens are recorded for this county. The larva of *D. bifida* has not shown up at all, and I only saw two or three of *N. dictæa*, *N. dictæoides*, and *N. dromedarius*. *N. ziczac* was fairly plentiful; but the pretty little *L. hallerata*, usually abundant most years, has been exceedingly scarce.—JOHN N. YOUNG; 85, Fitzwilliam Road, Rotherham.

Monmouthshire.—At the beginning of August, 1889, *Argynnis paphia* was extremely abundant along the banks of the Wye; there were literally thousands to be seen in the course of a walk, in splendid condition. *A. adippe* was also present, though not in the same abundance as *A. paphia*; but I did not see any specimens of *A. aglaia*. I took several of *Vanessa c-album* in fine condition. I also took two specimens of *Thecla w-album*, and saw others. There were a few *Thecla quercus* about, though these were not by any means plentiful. Several of the commoner butterflies were conspicuously absent: thus I saw none of the genus *Lycæna*, and no *Hesperidæ*. The only moth I captured was a solitary specimen of *Angerona prunaria*. I saw great numbers of larvæ of *Euchelia jacobæ* on the ragwort, and succeeded in rearing some of them. I found also many troops of young larvæ of *Bombyx quercus*: they were nearly all attacked by a kind of slug, owing probably to the wet summer. The most abundant insects in the locality were certainly *Argynnis paphia* and *A. adippe*. I noticed that all the Lepidoptera seemed much attracted to the banks of the river.—G. L. PATTEN.

COLIAS EDUSA IN 1889: ADDITIONAL RECORD—YORKSHIRE.—I saw on the 5th Sept., 1889, a fine male specimen, whilst driving near to Bishop Wood, on the Selby and York road. —SAMUEL WALKER; 75, Union Terrace, York, January 4, 1890.

ACHERONTIA ATROPOS IN 1889: AN ADDITIONAL RECORD—SOMERSETSHIRE.—To the list in the 'Entomologist' of localities in which *Acherontia atropos* appeared last season, I can add Clevedon, Somersetshire. Several larvæ and pupæ having been found, a friend, — a very careful collector, — was successful in rearing many imagines. All his pupæ were placed on the top of earth covered with a thick layer of moss, which was kept very damp. The box with the pupæ was placed against a

wall at the back of the kitchen range, so that the heat coming through the wall, kept up a warm temperature. The imagines commenced to emerge at the time they usually do in the natural state.—T. B. JEFFERYS; Blandford, January 6, 1890.

SPHINX CONVOLVULI IN 1889: ADDITIONAL RECORD, SUSSEX.—A specimen was taken at the head of the old pier here in September, apparently attracted by a gas-light. The length of the pier is 1130 feet, and surely an exceptional place to find this insect?—LOUIS MEADEN; 15, Elm Grove, Brighton.

ENTOMOLOGY OF HOLLAND AND BELGIUM.—I should be glad if any readers of the 'Entomologist' could give me the names of publications containing information respecting the above, especially relating to the Forest of Ardennes; also where I may obtain a list of the butterflies of the above-mentioned countries.—W. H. BATH; Ladywood, Birmingham.

ERRATUM.—In my "Notes on *Agrotis ashworthii*," in January number, the bottom line on page 6 should read "the back of each segment two oblong marks of intense," &c.—WILLOUGHBY GARDNER.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*January 15, 1890, the 57th Annual Meeting.*—The Right Honble. Lord WALSLINGHAM, M.A., F.R.S., President, in the chair. An abstract of the Treasurer's accounts, showing that the finances of the Society were in a thoroughly satisfactory condition, was read by Dr. Sharp, one of the Auditors. The Secretary then read the Report of the Council, from which it appeared that the Society had lost during the year several Fellows by death and had elected 24 new Fellows; that the volume of Transactions for the year extended to nearly 600 pages, and comprised 23 memoirs, contributed by 20 authors and illustrated by 17 plates; and that the sale of the Society's Transactions and other publications is on the increase. It was then announced that the following gentlemen had been elected as Officers and Council for 1890:—President, The Right Honble. Lord Walsingham, M.A., F.R.S.; Treasurer, Mr. Edward Saunders, F.L.S.; Secretaries, Mr. Herbert Goss, F.L.S., and the Rev. Canon Fowler, M.A., F.L.S.; Librarian, Mr. Ferdinand Grut, F.L.S.; and as other Members of Council, Mr. J. W. Dunning, M.A., F.L.S., Captain H. J. Elwes, F.L.S., Mr. F. DuCane Godman, M.A., F.R.S., Dr. P. B. Mason, F.L.S., Prof. R. Meldola, F.R.S., Mr. R. South, Mr. Henry T. Stainton, F.R.S., and Mr. Roland Trimen, F.R.S. Lord Walsingham nominated Mr. J. W. Dunning, Captain Elwes and Mr. F. DuCane Godman, Vice-Presidents for the Session 1890—1891, and he then delivered an Address. After remarking on the attractive beauty of some of the larger diurnal Lepidoptera, and the brilliant metallic colouring of certain species of Coleoptera, the influence that such magnificent examples of the wealth of design in Nature might have upon artistic taste, and the consequent refinement and increased enjoyment of life, Lord Walsing-

ham referred, in illustration of the practical usefulness of entomological studies, to the successful importation into California of the Australian parasites infesting the scale insect (*Icerya purchasi*), which had proved so noxious to the orange plantations. Through the efforts of Prof. Riley, upwards of 10,000 parasites had been distributed and had since spread very widely, so that in many localities the orange and other trees hitherto thickly infested with this noxious insect had been practically cleared of it by their aid; he also referred to the successful fertilisation of red clover in New Zealand by the importation of impregnated queens of the common humble-bee, and to the uses to which the silk produced by various exotic species of Bombycidae had now been successfully applied. Reference was then made to the investigation instituted by Mr. Francis Galton, and to the experiments of Mr. F. Merrifield, with the view of determining the percentage of hereditary transmission to successive offspring by different generations of successors, and to the valuable auxiliary such experiments and the researches of Professor Weismann, Mr. Poulton, and others might prove to the study of the laws of heredity, protective resemblance, and natural selection. It was then observed that even if the study of Entomology could claim to have conferred no greater benefits upon the human race than to have afforded to many members of our urban population an inducement to improve their minds and recreate their bodies, it would have contributed in no small degree to the sum of human health, happiness, and morality; in connection with these remarks he quoted the words of the Abbé Umhang in his obituary notice of Henri de Peyerimhoff, "J'ai connu plus d'un jeune homme qui s'est passionné pour une branche de l'histoire naturelle, et je n'en ai vu aucun s'écarter du chemin de la vertu et de l'honneur." Attention was then drawn to the enormous numbers of species of Insecta as compared with the numbers of species of other orders of the Animal Kingdom, and an approximate estimate was made of the extent of the field of Entomology, and of its relation to other branches of biological study. In connection with the subject of the principal works in Entomology continued or completed during the year, special mention was made of the 'Biologia Centrali Americana,' by Messrs. Godman and Salvin, and the 'Revisio Insectorum Familiæ Mantidarum,' by Professor Westwood. In conclusion, Lord Walsingham referred to the losses by death during the past year of several Fellows of the Society and other entomologists, mention being made of Mr. F. Bond, Dr. Signoret, Mons. Puls, Colonel C. J. Cox, Pastor Holmgren, Dr. Franz Löw, Dr. Karl Venus, and the Rev. J. G. Wood. A vote of thanks to the President for his services during the year and for his address was proposed by Mr. H. T. Stainton, seconded by Prof. Meldola, and carried. Mr. Elwes then proposed a vote of thanks to the other officers of the Society, which was seconded by Dr. Sharp and carried. Lord Walsingham, Mr. Goss, Canon Fowler, and Mr. Grut replied.—H. Goss, *Hon. Sec.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.
—December 12th, 1889. T. R. Billups, President, in the chair. Mr.

A. Beaumont, of Lewisham, was elected a member. Mr. R. Adkin exhibited very strongly marked specimens of *Peronea sponsana*, from the New Forest. Mr. South remarked that nearly all the examples of this species he had taken at Haslemere were of this form, although the markings were not quite so dark. Mr. Barrett said that he had had considerable experience of collecting at Haslemere, but had never met with this form, which was evidently a local race. Mr. Tugwell exhibited pale grey specimens of *Tæniocampa gracilis* from the London district, and reddish examples of the same species from the New Forest. Mr. Ince, a large collection of spiders from Switzerland. Mr. Carpenter, varieties of *Hybernia defoliaria*. The Secretary read a note from Mr. T. D. A. Cockerell, upon "The Colours Red and Yellow," and Mr. South made some observations thereon.

January 9th, 1890.—The President in the chair. Messrs. F. H. Atkinson, of Pimlico; C. F. Johnson, of Highbury; and F. Grover, of Westminster, were elected members. Mr. Hawes exhibited specimens of *Hesperia lineola*, and remarked that he first met with this species flying with *H. thaumas*, and was of opinion that *H. lineola* appeared when *H. thaumas* began to get worn. Mr. Carrington also showed examples of *H. lineola*, taken by himself about twenty miles from where Mr. Hawes captured his. Mr. Weir exhibited Continental examples of *H. lineola*, also a specimen which he had taken many years ago, but was not certain whether in Kent or Sussex, and an example of *H. thaumas* from Sussex, which bore a very close resemblance to *H. lineola*. Mr. South exhibited the specimens of *Peronea sponsana* from Haslemere, referred to at the last meeting, and made some observations on the named varieties of this species. Mr. R. Adkin, a short series of *Nepticula fulgens*, received from Mr. Vine, of Brighton. Mr. Carrington, an example of a butterfly which had been sent to him for identification, and was stated to have been captured in England, the species being *Syrichthus andromedæ*. Mr. Billups, *Andrena nigro-ænæ* and its internal parasite *Stylops*, taken at Dulwich, 1889; and on behalf of Mr. Bennett, of Hastings, a living series of *Andrena clarkella* and its rare parasite *Nomada borealis*, taken from its nidus, on the 6th of the month, at Hastings. A communication was read from Mr. Strong relating to an immense swarm of moths at Williamstown about the end of October last.—H. W. BARKER, *Hon. Sec.*

LIANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY.—The annual meeting of this Society was held on January 13th, in the Free Library, William Brown Street, Liverpool. The President, Mr. S. J. Capper, F.L.S., delivered an address, in which, among other matters of interest to entomologists, brief reference was made to the history of the Society since its foundation in 1877. The inaugural meeting was held at Mr. Capper's house, at Huyton Park; the original members were eleven in number; and the first President has been re-elected, year by year, up to date. Meetings are held on the second Monday in each month, and entomological visitors will be sure of a cordial welcome.

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THE EVOLUTION OF INSECT-GALLS.

By T. D. A. COCKERELL.

PROF. G. J. ROMANES, in 'Nature,' November, 1889, p. 80, has a letter on the subject of galls. After quoting Mr. Mivart's remarks on the "disinterested" nature of galls, he himself also says that he has always considered gall-formation "one of the most important facts in organic nature with reference to the theory of natural selection;" and this because it is "the one and only case in the whole range of organic nature where it can be truly said that we have unequivocal evidence of a structure occurring in one species [the plant] for the exclusive benefit of another" [the gall-insect].

The assumption then is that the various forms of galls are formed solely, and have been evolved only, for the benefit of the gall-insects themselves, a phenomenon which Prof. Romanes justly regards as very exceptional. But the exception seems to me to be only apparent and not real.

Let us consider the probable phases in the evolution of galls. Doubtless there were internal plant-feeding larvæ before there were galls; and, indeed, we have geological evidence that boring insects date very far back indeed. The primitive internal feeders, then, were miners in the roots, stems, twigs, or leaves, such as occur very commonly at the present day. These miners are excessively harmful to plant-life, and form a class of the most destructive insect-pests known to the farmer: they frequently cause the death of the whole or part of the plant attacked. Now, we may suppose that the secretions of certain of these insects caused a swelling to appear where the larvæ lived, and on this excrescence the larvæ fed. It is easy to see that the greater the excrescence, and the greater the tendency of the larvæ to feed upon it, instead of destroying the vital tissues, the smaller is the amount of harm to the plant. Now the con-

tinued life and vitality of the plant is beneficial to the larvæ, and the larger or more perfect the gall, the greater the amount of available food. Hence natural selection will have preserved and accumulated the gall-forming tendencies, as not only beneficial to the larvæ, but as a means whereby the larvæ can feed with *least harm to the plant*. So far from being developed for the exclusive benefit of the larvæ, it is easy to see that, allowing a tendency to gall-formation, *natural selection would have developed galls exclusively for the benefit of the plants*, so that they might suffer a minimum of harm from the unavoidable attacks of insects.

But here it may be questioned—Have we proof that internal feeders tend to form galls? In answer to this I would point out that gall-formation is a peculiar feature, and cannot be expected to arise in every group of internal feeders. But I think we can afford sufficient proof that wherever it has arisen it has been preserved; and further, that even the highly complex forms of galls are evolved from forms so simple that we hesitate to call them galls at all.

Let us first take the Hymenoptera, which form so many galls. The North American oak-galls, formed by species of Cynipidæ, afford every gradation of character. They may be divided into sections; the galls in the first section being so essentially part of the branch that they cannot be removed without taking away part of the branch or twig with them. The second section comprises galls on the branches, but of a different substance from the branch, so that they can be removed without taking a portion of the branch with them. Then of leaf-galls we have again two sections, one consisting of galls which cannot be separated from the leaf, the other of galls which are separable from the leaf-tissues.* Finally, there is a section comprising galls on the roots.

To take individual instances: the gall of *Andricus cryptus*, Ashm., is hidden under the bark, so as to be invisible externally. The gall of *A. gemmarius*, Ashm., is tubular or fusiform. But a third species in the same genus, *A. pomiformis*, Bass., forms a globular polythalamous gall. *A. piger*, Bass., forms a swelling of the leaf; but *A. virens*, Ashm., forms a true globular leaf-gall. So that, although we cannot actually observe the evolution, its stages have been preserved for us in certain species. *Diastrophus fusiformans*, n. sp., forms merely fusiform swellings of the stems of *Potentilla* in Custer County, Colorado; but *D. potentillæ*, Bass., forms oblong spongy galls.

The rose-galls also show us various stages of evolution. In Custer County, Colorado, we have three kinds of leaf-galls on roses. *Rhodites rosæfoliæ*, mihi, forms galls which are nothing

* See 'On the Cynipidous Galls of Florida,' by W. H. Ashmead.

more than flattish swellings of the leaflets. The galls of *R. globosus*, n. sp., are globular, and very little attached to the leaf; and *R. spinosellus*, n. sp., makes globular spiny galls on the leaves, like those of *R. bicolor* in miniature. Of rose-galls on the stems we get first fusiform or irregular roughish galls on the stems and branches, formed by *R. fusiformans*, n. sp., and occurring at West Cliff. Next are globular smooth galls, the product of *R. ignota*, Osten Sacken, and larger and roughish globular galls formed by *R. tuberculator*, Riley. Finally, the galls of *R. bicolor*, Harris, are globular and excessively prickly, while those of *R. rosæ*, Linn., develop moss-like hairs.

Some sawflies, as *Phyllæcus integer*, Norton, are simple internal feeders in twigs; but species of *Euura* and *Nematus* form true galls. In North America nine species of sawfly galls occur on the willow.

Turning to Diptera the same gradations of types are to be observed. The swelling produced by *Cecidomyia destructor*, Say, is hardly to be called a gall, and is quite inconspicuous—yet how destructive! Compare this with the white, woolly, conspicuous galls of *Trypeta bigeloviæ*, n. sp., produced in abundance at West Cliff, Colorado, on *Bigelovia*, and yet apparently not injuring the plant seriously at all.

Cecidomyia, which reaches its maximum of destructiveness in the non-gall-making species, as *C. destructor*, yet has myriads of forms producing genuine galls. Thus on *Carya* are eight species of galls produced by *Cecidomyia*.

The Dipterous willow-galls of West Cliff, Colorado, are very instructive. A species doubtfully referred to *Cecidomyia salicis-nodulus*, Walsh, produces an elongate fusiform hard woody swelling of the stem, hardly a true gall at all. *C. silicis-saliqua*, Walsh, makes broader reddish fusiform swellings, which are very conspicuous. Then *C. salicis-batatas*, Walsh, or an allied species, forms large irregular potato-shaped galls at the end of the twigs.

Among Lepidoptera we have any number of internal feeders, which there is no occasion to enumerate; but *Gelechia gallæ-solidaginis*, Riley, forms genuine galls on *Solidago*. Many other Lepidoptera have been bred from galls, but in most cases the evidence points to their being mere inquiline.

I think I have now given sufficient evidence to show that we have all the gradations from mere stem-borers to complicated galls, and the idea that they evolved in the way I have indicated is irresistible.

The study of galls and the rearing of gall-insects is a most fascinating pursuit, offering much chance of new discovery. Galls may be collected in the early spring, and as the warm weather comes on they yield their inhabitants without any

special attention. It is surprising to me that galls and their inhabitants are not more a subject of study among entomologists.*

West Cliff, Custer Co., Colorado, January 23, 1890.

NOTES ON THE ECONOMY OF *RETINIA RESINELLA*, LINN.

By R. ADKIN, F.E.S.

IN the spring of 1888, I heard from Mr. Salvage, who was then collecting in the neighbourhood of Forres, that a number of the twigs of the Scotch fir (*Pinus sylvestris*, L.) had attached to them nodular masses of resinous matter containing larvæ, which he believed to be those of *Retinia resinella*, and I subsequently received some of the twigs from him. These I placed in sand, kept moistened so as to prevent the twigs becoming unnaturally dry, and allowed them to remain out of doors until the imagines emerged; in the interim observations were made, with a view, more especially, of ascertaining any facts that might have a bearing upon the opinion that had been expressed, that the larva of this species occupied a period approaching two years in feeding up.

Examining the twigs externally when received, it was evident that the resinous nodules were invariably fixed to wood of the previous year's growth; that what should have been the leading shoot of the then present year was much dwarfed, and in some cases represented by little more than a bud, giving the impression that it had been mined at some anterior period. This at once suggested an examination of the interior, but as it would have been necessary to open several twigs to gain any satisfactory information in this direction, and as such a proceeding was calculated to kill the larvæ, it was postponed until such time as the moths should come forth; only a sufficient number of the nodules being opened from time to time to ascertain the condition of their tenants. In due course the desired conditions were fulfilled, and it was then found that the most satisfactory method of arriving at the object in view was by cutting longitudinally through the twig and nodule together, the fibre of the former and the semi-crystalline substance of the latter yielding readily to the persuasive dissecting knife, and thus exposing to view in section the workings made by the larva throughout its life. These may be briefly summarised thus:—A narrow gallery under the bark of the twig, on the side opposite to that to which the nodule is attached, commences at a point nearly level with the

* Note.—I am indebted to Dr. C. V. Riley and Mr. W. H. Ashmead for identification of several of the galls mentioned. The new species will be fully described hereafter.

centre of the nodule, thence proceeding to the base of the young shoot, which is completely hollowed out, and entering the nodule, which is divided into an inner and an outer chamber, at the upper end of the latter, the inner apparently being reserved for pupation. The order of procedure in the formation of these workings would appear to be as follows:—The young larva upon leaving the egg eats through the bark of a twig near the extremity of the old wood, and taking a course in the direction of growth, keeping always on the same side, soon reaches the young growing shoot, upon the soft wood of which it feeds, probably consuming it during the summer of its first year. It now becomes necessary that it should provide for passing the winter, and having weakened the terminal shoot by reducing it to a mere shell at its base, it is desirable that it should provide a more substantial habitation in which to weather the storm; it is probably at this time that the bark is again pierced, but on the opposite side to that by which the larva entered, and by a larger hole, through which the sap would flow readily, and, congealing as it reaches the air, at once begin to form a resinous mass, which by its own weight, would spread in the direction of the trunk of the tree, the larva as it does so following its movement, and, by removing the bark as it becomes covered, increase the flow of the resinous juices until the nodule has attained a sufficient size; being hollowed out the meanwhile into the chambers above referred to, and the domicile completed in which the larva is to spend the remainder of its existence.

It was after having attained this stage that the larvæ under notice were first observed in the early days of May, 1888; they were still small, and showed little signs of growth until the end of that month; but from this time they grew rapidly, and by the end of June had the appearance of being full fed, in which condition they remained until the spring of 1889, the pupal stage being reached by the 20th April, and the imagines emerged between 25th May and 3rd June. During the time that the larva is in the nodule, it appears to reside in the outer of the two chambers, and to gain what sustenance it requires from the juices that ooze into its apartment from the tree.

Thus the time from the finding of the larvæ to the appearance of the imagines was some thirteen months, and it is evident that the larvæ when first noted, had already been feeding for some considerable time, and had indeed completed the earlier stages of their existence; there appears, therefore, to be no doubt that this species does occupy a period of two years in completing its metamorphoses.

Wellfield, Lingards Road, Lewisham, February, 1890.

RHOPALOCERA AT DIGNE.

BY MRS. NICHOLL.

THE butterflies of Switzerland are nearly as well known to British entomologists as those of our own island. Everybody goes to Switzerland, and many people catch butterflies during their holiday, and consequently the chance of finding a new variety, or a new locality for a species, is but very slight. This, however, is by no means the case in the South-eastern departments of France. Hautes Alpes, Basses Alpes, Isère, and Var, present a wide and little-explored field to the butterfly hunter, and if the district were thoroughly worked it is more than probable that new varieties, and even new species, might be found there. The country is very mountainous, and presents a great variety of geological formation, combined with a climate far warmer than that of Switzerland; and although the general character of the mountains is bare and stony, yet there remain many forests of birch, beech, oak, and pine, and many rich mountain pastures, where the flora is even more varied and beautiful than that of the Swiss Alps.

The inns of this country are generally reported to be exceedingly bad, but this is now no longer the case. Digne, Barcelonnette, and Briançon possess excellent hotels; and good clean mountain inns, affording excellent accommodation, are to be found at Ville Vallouise, Monetier, La Grave, and La Bérarde. So the entomologist need not fear any great discomfort if he should be tempted into a voyage of discovery into a country which is probably rather less known than Japan to the ordinary English tourist.

We arrived at Digne on June 10th last, and remained there until July 2nd. We then went to Seyne and Barcelonnette, returning to Digne on July 9th, and remaining there till July 17th. I append a list of the more remarkable insects which I took at Digne during these two periods. The weather was generally fine and hot after the first week we spent there; but the season was fully a fortnight late, owing to the cold and wet which had prevailed south of the Alps during the months of April and May. It was, however, too late for the greatest of the local rarities,—*Thais rumina*, var. *honoratii*,—one of the most striking and beautiful of European butterflies, for which the neighbourhood of Digne is the only known locality. I succeeded in purchasing one from a peasant farmer who collects and sells them to Staudinger; but the season had been a very bad one: he had but two left in stock, and my specimen cost 25 fr. I believe that in a good year they can be had for 10 fr. It was also too late for the local *Erebia epistygne*, which flies on the high limestone ridge of the Dourbes during March and April; but this is always plentiful.

Between June 9th and July 2nd I caught the following butterflies:—

Papilio alexanor.—Common all round the town.

Parnassius apollo.—Near the Baths; not plentiful.

Thais rumina, var. *medesicaste*.—Common at the Baths, and in a little gorge running up into the ridge of limestone rocks behind the town.

Euchloë belia, var. *ausonia*.—Common on the limestone ridges. *E. tagis*, var. *bellezina* (nearly over).—On the Dourbes.

Leucophasia sinapis, var. *lathyri*.—Generally common.

Thecla ilicis, vars. *cerri* and *æsculi*.—Common.

Lycæna iolas (nearly over).—Two only, near the Baths.

Erebia evias and *E. epistygne*.—On the Dourbes.

Cænonympha dorus.—Common.

Spilothyrus lavateræ.—Common.

Argynnis adippe, var. *cleodoxa*.—Common. *A. daphne*.—Common.

Between July 11th and 16th, at Digne, I took the following:—

Thecla roboris.—Plenty about the oak trees in the little gorge running into the back of the "town rocks," all, however, a good deal worn, and had evidently been out some days. This rare insect probably flies for a very short time, as it was certainly not on the wing before July 1st. I scarcely found any after July 12th.

Lycæna meleager.—Very common. *L. admetus*, var. *ripperti*.—Common on lavender blossoms.

Libythea celtis.—Not uncommon (partial to clematis).

Vanessa egea.—Plentiful.

Parnassius mnemosyne.—Common at the foot of the precipice of the Dourbes.

Satyrus circe and *S. briseis*.—Very common. *S. fidia*.—Just coming out on the last day I had at Digne.

Melanargia galatea, var. *leucomelas*.—One only.

Syrichthus carthami.—Common. *S. alveus*.—Common. I also took a remarkable var., I think of *S. alveus*, in which the under side of the hind wings is brilliant red-brown—a bright shade of burnt sienna.

Erebia ligea.—In the forest on the side of the Dourbes. *E. glacialis*, var. *pluto*.—On the Dourbes. Had I remained a few days longer I should have taken *E. scipio* in plenty on the Dourbes. I got a good series of this handsome insect a week later, in Dauphiné. *Melanargia iapygia*, var. *cleante* is common at Digne in the month of August.

Besides these butterflies I took a good many beautiful species of Heterocera, but these I have not yet named. I failed to find the rare *Clostera alpina*, which is frequently met with on poplar trunks near the town.

Merthyr Mawr, Bridgend, Glamorganshire.

ON THE PHYLOGENETIC SIGNIFICANCE OF THE WING-MARKINGS IN CERTAIN GENERA OF THE NYMPHALIDÆ.*

By F. A. DIXEY, M.A., F.E.S., &c.

THE varied markings exhibited by the members of the genus *Vanessa* and its immediate allies (including the Argynnidæ), can all be reduced to one simple type, consisting essentially of four series of dark spots running in a direction almost parallel to the outer borders of both fore and hind wings. This pattern in its simplest form is seen in the genus *Argynnis*, and in a more highly specialised and decorative condition in the genera *Pyrameis*, *Grapta*, and *Vanessa*. The earliest type now extant is, perhaps, furnished by the female of *Argynnis diana*, in which the primitive pattern of spots is beginning to be established by a lightening of the dark blue ground colour in certain areas of the wing. A derived form (*A. sagana*, female), in which some of the lighter shadings have become almost white, may represent a transition from the primitive speckled condition to that which is the rule in *Apatura* and *Limenitis*; while the female of *A. niphe*, taken in connection with *A. paphia*, var. *valesina*, and *Clothilda pantherata*, indicates the path along which the generalised system of coloration prevailing among the Argynnids has become transformed into the more specialised pattern of the highly ornamental Vanessas. The blue patches, occurring in the sub-marginal band or chain of spots in many of the Vanessidæ, are probably a relic of the original deep blue or green ground colour of the genus *Argynnis*, to which so many female Argynnids show a tendency to revert; the bright brown, salmon-coloured, or scarlet ground colour of Vanessids being derived from the fulvous tint generally belonging to the male Argynnids, and in a less degree to the females. From the "Protovanessa," or common ancestor of the genus *Vanessa* in the widest sense, three principal lines seem to have diverged; the first leading in the direction of the genus *Pyrameis*; the second towards the interesting genus *Araschnia*; the third through the genus *Grapta* to *V. polychloros*, *V. urticae*, *V. milberti*, &c. The genus *Eurema* would seem to be an offshoot from the first of these stems; the two species, *V. io* and *V. antiopa*, from the last. Special attention was drawn to the rudimentary ocellus in the hind wing of *V. io*, as indicating that the large ocellus nearer the costa was mainly formed out of three members of a series of blue-centred black spots, well marked in *P. gonerilla*, *P. itea*, and many other species closely allied to *P. cardui*; this conclusion being strengthened by the condition of the ocellus in a variety of *V. io*, figured in the 'Entomologist,' vol. xxii. Pl. viii. fig. 8.

* Epitome of a paper read before the Entomological Society, London, Feb. 5, 1890.

NEW SPECIES OF LEPIDOPTERA FROM CHINA.

By J. H. LEECH, B.A., F.Z.S., &c.

(Continued from p. 50.)

HEMARIS STAUDINGERI, sp. n.

All the wings hyaline; primaries with black base, costa and inner margin, the latter tapering towards outer angle; outer margin brownish black, broader towards the apex, and encroaching into each internervular space. Secondaries with a broad, black, inner margin, and narrow outer border. Thorax olive-brown; patagia tinged with reddish; body black, segments 11 to 13, reddish orange; anal tuft black. Under surface as above, but head, pectus and anterior legs yellowish white, and the 11th and 12th segments of body bordered with yellow. Expanse: male, 58 mm.; female, 66 mm.

Five males and one female taken at Chang Yang in July.

Allied to *Hemaris alternata*, Butl., but the borders of all the wings are narrower, and black instead of brown; the patch at base of secondaries is also black.

PHAUDA PRATTI, sp. n.

♂. Primaries golden-orange, suffused with dusky about the disc and outer margins, and pale at apex, where also the fringes are whitish. Secondaries subhyaline, outer half blackish; inner margins clothed with reddish orange hairs; fringes black; body black, clothed about base with reddish orange hairs. Under surface as above; pectus, abdomen and legs golden-orange. Expanse, 29 mm.

One male taken near Ichang in July.

Allied to *Phauda fortunei*, H.-S., but at once separated by the absence of black apical patch on primaries.

TEGULATA FIMBRIATA, sp. n.

Primaries pale cinnamon-brown, clouded with darker across the discal area; a broad blackish spot, set in a pale grey patch, on costa near base, and a small colon-like mark beyond; the subcostal nervure is deeply fringed with greyish silky hairs. Secondaries pale brown, darker towards outer margin. Under surface of primaries fuliginous-brown, costa tinged with yellowish; secondaries pale yellowish brown, with an obscure dark ante-marginal band. Expanse, 32 mm.

One specimen taken in July at Chang Yang.

Allied to *Tegulata protuberans*, Moore, from Darjeeling.

KATHA MOOREI, sp. n.

♂. Primaries pearly grey, darker along the costa and outer third of the wing. Secondaries yellowish buff. Head, thorax, body and antennæ dark pearly grey. Under surface as above, but rather fainter. Expanse, 42 mm.

One male taken at Chang Yang in June.

LITHOSIA LENTA, sp. n.

♂. Primaries uniform pearly grey, silky, and slightly tinged with yellow along the costa. Secondaries rather paler, especially towards the costa. Head yellow, thorax and body pearly grey, anal tuft yellow. Under surface as above, but rather paler. Expanse, 22 mm.

Two males, one taken at Chang Yang in June, the other near Ichang in July.

LITHOSIA COSTIPUNCTA, sp. n.

♂. Ground colour of primaries rich orange, with a round black spot just below middle of costa. Secondaries rather paler. Under surface the same as above, but slightly paler and with no indication of the black costal spot; legs blackish. Expanse, 37 mm.

One male taken at Chang Yang in June.

SETINA UNIPUNCTA, sp. n.

♂. Primaries yellow, costa inclined to orange, costal spot black and distinct. Secondaries paler. Under surface of primaries fuliginous, all the margins yellow, as also is the discoidal cell, central spot indistinct; secondaries as above, but costa deeper yellow. Head and thorax colour of primaries; abdomen paler, tinged with grey towards anal segment, which is yellow.

♀. Primaries reddish orange, the discal area suffused with yellowish, black central spot. Secondaries pinkish red. Under surface as in the male, but the yellow is replaced by red. Expanse: male, 34 mm.; female, 38 mm.

Two specimens taken at Chang Yang (female in May; male in June).

SETINA RUBRICANS, sp. n.

Primaries rosy-buff; costa black at base; discal spot large, black, a smaller one below on the inner margin; there is also a submarginal series of small black spots. Secondaries paler, rather darker along outer margin. Under surface: primaries suffused with black along the centre of the wing and basal portion of costa; secondaries with a marginal row of five small black spots; legs marked with black. Expanse: male, 30 mm.; female, 34 mm.

A nice series taken at Chang Yang, in June; also specimens from the neighbourhood of Ichang, in July. There is an unnamed specimen from Pekin in the National Collection at South Kensington, which I believe is referable to this species.

MILTOCHRISTA RIVALIS, sp. n.

Closely allied to *M. inscripta*, Walk., but smaller, and the discal area of primaries much whiter; there is a black dot at the base and a pink streak above on the costa, but no other black marks before the first line, which is distinctly curved. Expanse: male 22 mm.; female, 27 mm.

Several specimens taken at Chang Yang in June, and at Ichang in July; also one female example taken by my native collector at Gensan in July, 1887, which at first I thought was probably a variety of *M. inscripta*. The differences referred to are constant.

MILTOCHRISTA RUFA, sp. n.

Primaries reddish orange; basal and outer thirds blackish, the external edge of former oblique and internal edge of the latter curved, meeting on the inner margin. Secondaries orange-yellow, outer margin bordered with blackish. Fringes reddish orange. Under surface orange-yellow; base of costa and border of outer margin of primaries blackish, as also is the narrower outer border of secondaries; fringes as above. Head and thorax orange-yellow; abdomen rather darker. Expanse, 24—27 mm.

Six specimens taken in June at Chang Yang.

PENTACITROTUS AENEUS, sp. n.

♂. Primaries cupreous-yellow; two transverse black angulated bands, with metallic-blue spots, are united by a longitudinal streak from one to the other above the middle; there is also a black streak on inner margin from base to first band; beyond second band is a small black spot, and the apex has a narrow black border in which are some metallic-blue dots. Secondaries yellow, with two large black spots before the outer margin. Under surface yellow; markings as above, but there are no blue spots on primaries. Expanse, 27 mm.

One male example taken in June at Chang Yang.

A female specimen of this species, from Darjeeling, in the National Museum at South Kensington, has the bands on the primaries interrupted.

HYLOPHILA MAGNIFICA, sp. n.

♂. Primaries rosy, suffused with brownish about the disc and basal portion of costa; the cell and basal portion below it bright mossy green; a broad submarginal band of green, dark along its inner margin, and traversed by a whitish line from apex to inner margin. Secondaries pale golden-brown; neuration and fringes rosy. Abdomen light golden-brown. Under surface as above, but fainter. Head and thorax moss-green, streaked with rosy; legs rosy; antennæ rosy above, brownish beneath. Expanse, 34 mm.

One male of this lovely species taken at Chang Yang in May.

SETORA DIVISA, sp. n.

♂. Primaries: basal two-thirds dark chocolate-brown; outer third paler; outer line chocolate-brown, and a few dashes of the same colour along the outer margin; a dark line precedes the fringes, which are intersected by a pale line; discoidal spot black. Secondaries fuscous-brown, with a pale marginal line; fringes intersected by a pale line. Under surface uniform fuscous-brown, with a pale marginal line. Expanse, 26 mm.

One male taken at Chang Yang in June.

HETEROGENEA OBLIQUA, sp. n.

♂. Primaries yellowish-buff, sprinkled with reddish-brown scales; a straight dark brown line runs from apex to near the base of inner margin; there is also a narrower, dark brown, submarginal line. Secondaries fuscous-grey, with silky reflections. Head and thorax yellowish buff; body rather darker. Under surface yellowish, sprinkled with darker scales. Expanse, 30 mm.

One male taken at Chang Yang in July.

ATOSSA NELCYMNA.

Atossa nelcymna, Moore, Proc. Zool. Soc. 1874, p. 577, pl. lxvii., fig. 7,

Calcosia palæarctica, Staud., Rom. Mém. Lep. iii. p. 192, pl. xi. fig. 3, 1887.

Var. *chinensis*.

♀. In this form the neuration is broadly bordered with blackish; the outer third of all the wings is much suffused with the same colour, and sprinkled with greenish grey scales. Expanse, 79 mm.

I received one female taken at Chang Yang in June.

(To be continued.)

DESCRIPTIONS OF NEW SPECIES OF PHYTOPHAGOUS
COLEOPTERA RECEIVED BY MR. J. H. LEECH, FROM
CHANG-YANG, CHINA.

BY MARTIN JACOBY, F.E.S.

DONACIA LONGICORNIS, n. sp. (Plate I. fig. 2).

Subdepressed, obscure greenish or brownish cupreous; antennæ as long as the body (♂); thorax constricted at the base, the sides tuberculate anteriorly, the surface transversely strigose; elytra punctate-striate, the interstices transversely wrinkled, the apex truncate.

♂. The posterior femora extending much beyond the elytra, with a stout tooth, their tibiæ curved, finely dentate at the inner margin, triangularly toothed below the middle. ♀. Antennæ shorter; femora not produced beyond the elytra, obsoletely toothed, their tibiæ simple, unarmed. Length, $4\frac{1}{2}$ —5 lines.

♂. Head minutely rugose, with a deep central groove between the antennæ; eyes rather small; palpi and mandibles piceous; antennæ as long or longer than the body, black, very finely pubescent, the third joint distinctly longer than the fourth and the longest; thorax slightly longer than broad, the anterior portion much widened and swollen in shape of rounded tubercles at the sides, the anterior angles also distinctly tuberculiform, the surface flattened with a central longitudinal groove, entirely and closely transversely strigose without punctuation; scutellum clothed with fine greenish pubescence; elytra flattened, their apex truncate, the surface transversely rugose or wrinkled, the punctured striæ placed at regular intervals, the punctures rounded at the base, more elongate towards the middle, and distinct to the apex; the underside metallic, clothed with very short yellowish pubescence.

A few specimens.

This *Donacia* will not be very difficult to recognize on account of the long and slender antennæ, the long posterior femora and dentate tibiæ of the male insect; the female differs considerably in this, but in no other respect; the strongly swollen anterior portion of the thorax will further assist in the recognition of the species.

CHALCOLEMA, n. gen. (CRIO CERIDÆ ?)

Body elongate; eyes small, entire; antennæ widely separated, filiform, the first and second joints short, the others elongate; thorax subquadrate, the lateral margin distinct, the disc flattened, foveolate; scutellum not longer than broad, its apex broadly truncate; elytra irregularly punctured, sparingly pubescent, their epipleuræ narrow; legs moderate, the femora thickened, the posterior ones more strongly incrassate; the first joint of the posterior tarsi as long as the two following ones together; claws appendiculate; prosternum broad, slightly longer than broad; mesosternum constricted at the middle; the first abdominal segment double the length of the second one.

The species, for the reception of which I propose the present genus, and of which only a single specimen was received, seems to form a most interesting link between the *Sagridæ* and *Crioceridæ* on one hand, and the *Megascelidæ* on the other. I cannot at present, however, give an opinion on its true systematic position, since the insect seems to unite characters to be found singly

in several tribes, and divided amongst their respective genera; thus, *Chalcolema* has the head and antennæ of a *Megascelis*, a thorax peculiar to itself on account of a distinct lateral margin and its general shape, while the proportionate length of the abdominal segments resemble those of the *Crioceridæ*, as well as its general elongate shape and narrow elytral epipleuræ; the appendiculate claws, however, again separate it from the last-named tribe.

Type, *Chalcolema foveicollis*.

CHALCOLEMA FOVEICOLLIS, n. sp. (Plate I. fig. 1).

Black; the head, thorax, and legs fulvous; elytra metallic dark blue; thorax remotely punctured, deeply foveolate at the sides; elytra closely and strongly punctured, finely pubescent. Length, $4\frac{1}{2}$ lines.

Head swollen at the vertex, strongly but remotely punctured, with a central longitudinal groove; clypeus wedge-shaped, deflexed, its surface concave, its anterior margin emarginate, obliquely angulate at the sides; labrum transverse, deeply concave at its anterior margin; mandibles very robust and thickened; palpi filiform, black, the terminal joint longer than broad, pointed; antennæ more than half the length of the body, black, the basal joint obscure fulvous below, short and thickened, the second slightly shorter and less stout, the others elongate and slender, nearly equal in length, the terminal joint with a short and pointed appendage; thorax slightly broader than long, the base somewhat narrower, the anterior angles tuberculiform, the surface very remotely but distinctly punctured, fulvous, shining, with a deep longitudinal fovea near the lateral margin, and a larger and more rounded one at each side near the base; scutellum black, shining; elytra elongate, slightly constricted at the middle, the shoulders prominent and acute, bounded inwards by a deep longitudinal depression, the disc closely impressed with smaller and larger punctures, the interstices somewhat transversely rugose (especially near the suture), and sparingly clothed with short pubescence; underside black, shining, the coxæ, legs, and the prosternum fulvous; tibiæ clothed with yellowish pubescence.

LEMA CHINENSIS, n. sp.

Black; the base of the head, thorax and elytra fulvous; thorax impunctate; elytra with a sutural depression, strongly punctate-striate; abdomen and the middle of the breast, fulvous. Length, $2-2\frac{1}{2}$ lines.

Head black, the base and two rather strongly raised tubercles between the eyes fulvous; eyes deeply indented, the lateral grooves deep, the lower portion of the face sparingly clothed with yellow pubescent; antennæ rather short and robust, entirely black, the fourth joint slightly longer than the third; thorax not longer than broad, the sides rather deeply constricted, the basal sulcation distinct, placed at some distance from the base, the anterior angles with a minute tubercle bearing a single hair, the surface impunctate; scutellum fulvous; elytra with a distinct sutural depression below the base, regularly and rather deeply punctate-striate, the interstices at the sides and at the apex, costate; underside clothed with fine yellow pubescence.

The entirely black antennæ, colour of the head and the two tubercles of the latter, as well as the fulvous abdomen, separate *L. chinensis* from its Asiatic congeners; the amount of fulvous of the breast is somewhat variable. The species seems allied to *L. russula*, Bohem. (*bohemani*, Clark), but differs in its coloration.

A few specimens.

TEMNASPIS HUMERALIS, n. sp. (Plate I. fig. 3).

Black, sparingly pubescent; thorax impunctate, with a tubercle at the posterior angles; elytra flavous, finely punctured, the shoulders with a black spot; abdomen and a spot on the posterior femora, flavous. Length, 5 lines.

Head broad, impunctate, black, with a deep fovea between the eyes; antennæ scarcely extending beyond the base of the thorax, black, the four basal joints shining, the rest opaque, transversely widened; thorax deeply transversely sulcate behind the anterior margin, with an acute lateral tubercle near the base, the surface smooth, shining, black, furnished with single erect black hairs; scutellum black, its apex slightly emarginate; elytra finely and not very closely punctured and sparingly clothed with black hairs, flavous, with a black spot placed on the humeral callus; underside and legs black, the metasternum with two triangular raised elevations; abdomen flavous; the posterior femora with an acute tooth near the apex, the latter flavous.

A single specimen.

GYNANDROPHTHALMA LÆVICOLLIS, n. sp.

Black; the head, thorax, scutellum and legs fulvous; elytra black; thorax impunctate, elytra closely punctured. Length, $1\frac{1}{2}$ lines.

Head smooth, impunctate; antennæ black, the lower four joints fulvous; thorax two and a half times broader than long, the sides rounded, widened towards the base, very narrowly margined, the surface impunctate fulvous, the posterior margin slightly produced and broadly rounded at the middle; scutellum broad, strongly pointed at the apex, the surface fulvous, impunctate; elytra parallel, black, closely punctured, the punctuation somewhat regularly arranged in rows, the lateral margin but slightly produced below the shoulders; under side black (with the exception of the anterior portion of the breast), finely clothed with greyish hairs; legs fulvous; the first joint of the posterior tarsi scarcely as long as the two following joints together.

Of this species, principally distinguished from its congeners by the fulvous head and the black elytra, many specimens were obtained.

GYNANDROPHTHALMA FULVEOLA, n. sp.

Entirely pale fulvous; apical joints of the antennæ fuscous; head and thorax impunctate; elytra finely and subregularly punctured, the apex nearly impunctate. Length, $1\frac{1}{2}$ line.

Head with a rather deep rounded fovea between the eyes, impunctate, the anterior margin of the epistome deeply concave-emarginate; labrum more or less black; antennæ not extending beyond the thorax, the lower four joints fulvous, the rest nearly black; thorax transverse, more than twice as broad as long in the male, the sides strongly rounded and widened at the base, the basal lobe scarcely produced, the surface entirely impunctate; scutellum triangular, acutely pointed; elytra moderately closely but finely punctured, the punctures semi-regularly arranged in rows, gradually diminishing towards the apex, the latter nearly impunctate under side and legs fulvous, finely pubescent.

Many specimens.

G. fulveola may be known by the entirely unicolorous fulvous colour, the impunctate head and thorax in connection with its small size.

CRYPTOCEPHALUS RECTIPENNIS, n. sp.

Metallic dark blue; the basal joints of the antennæ and the anterior femora fulvous; thorax rather closely punctured; elytra strongly punctate-striate, the interstices more or less convex.

♂. The lower portion of the head and the anterior angles of the thorax flavous; the elytral interstices rather convex and somewhat rugose. ♀. The head and thorax unicolorous dark blue, the latter closely strigose-punctate. Length, $\frac{3}{4}$ — $1\frac{1}{4}$ line.

♂. Head with a few punctures, the vertex piceous, this colour projecting into three points into the flavous portion of the lower part of the head; eyes not deeply emarginate; palpi piceous; antennæ half the length of the body, the five or six lower joints flavous, the rest fuscous, the third joint scarcely longer than the second one; thorax strongly transverse, the sides rather rounded at the middle, the angles acutely pointed, the disc with a more or less distinct transverse depression at each side, rather closely impressed with elongate punctures, which are more numerous at the sides than at the disc; scutellum black, slightly raised; elytra without distinct lateral lobe, rather flattened, strongly punctate-striate, the interstices convex at the sides and somewhat rugose, the shoulders raised, narrow; under side and legs nearly black, the four anterior femora and the prosternum fulvous.

This small species, of which several specimens are contained in this collection, seems allied to *C. pumilio*, Suffr., but is, I think, distinct from that species; its colour is not blackish green but dark blue: the thorax has closely placed and elongate punctures, which in the female insect almost occupy the entire sides, forming strigæ; the sculpture of the elytra also differs apparently from *C. pumilio*, as the interstices are distinctly raised at the sides in *C. rectipennis* and irregularly wrinkled.

CRYPTOCEPHALUS NIGROLIMBATUS, n. sp. (Plate I., fig. 6.)

Below black, above pale flavous; antennæ black, the basal four joints fulvous; thorax impunctate; elytra strongly punctate-striate, narrowly margined with black; legs fulvous. Length, $1\frac{1}{2}$ —2 lines.

Head impunctate, shining, flavous; eyes moderately deeply notched; epistome separated from the face by a deep oblique groove; antennæ two-thirds the length of the body, the basal four joints fulvous, the rest black; thorax narrowly transverse, the sides slightly rounded, very narrowly margined, the surface entirely impunctate, shining, flavous, the extreme basal margin black; scutellum flavous, margined with black; elytra deeply punctate-striate, the punctures visible to the apex but finer, the interstices smooth, scarcely raised, flavous, the extreme sutural and lateral margins, and the epipleuræ partly, black; pygidium flavous; under side black, prosternum flavous; the last abdominal segment in the female flavous, with a deep oblong fovea.

The black under side and similarly coloured narrow elytral margins distinguish *C. nigrolimbatus* from *C. pini*, *C. hecticus*, Fab., and other unicolorous species: the female specimens are considerably larger than the male, but do not differ in any important way.

A small number of specimens.

CRYPTOCEPHALUS NASUTULUS, Weise.

Several specimens agreeing closely with the author's description were obtained. I must, however, add that the thorax in all

is moderately closely and distinctly punctured (Weise calls the punctuation obscure), and that there is a lateral depression distinctly visible in the female, less so in the male, at each side; *C. nasutulus* is allied to *C. fortunatus*, *C. approximatus*, Baly, *C. kulibini*, Gebl., and *C. splendens*, Kraatz.

CRYPTOCEPHALUS FESTIVUS, n. sp. (Plate I., fig. 4.)

Flavous; the terminal joints of the antennæ and the middle of the breast and abdomen black; thorax impunctate; elytra violaceous-blue, strongly punctate-striate, the interspaces smooth, the lateral margin anteriorly flavous. Length, $1\frac{1}{2}$ —2 lines.

Head nearly impunctate, flavous, the extreme vertex blackish with a few fine punctures; antennæ long and slender, two-thirds the length of the body, the lower four joints flavous, the rest black; thorax transverse, strongly narrowed in front, the sides but moderately deflexed with a narrow margin, the lateral margin nearly straight, the surface entirely impunctate, flavous; scutellum black, slightly longer than broad, its apex truncate; elytra regularly and strongly punctate-striate, the punctures distinct to the apex, metallic violaceous, the interstices flat and impunctate, the anterior margin and the epipleuræ at the base flavous; pygidium, under side and legs pale flavous, the centre of the lower portion of the breast and of the abdomen black, the apex of the last abdominal segment in the male slightly emarginate at the middle, that of the female with the usual deep fovea.

I am not acquainted with any eastern *Cryptocephalus* agreeing in coloration with the present insect, of which a dozen specimens were received; the flavous colour of the lateral margin and of the epipleuræ extends to the middle of the elytra.

CRYPTOCEPHALUS FLAVOPICTUS, n. sp. (Plate I., fig. 5.)

Black, finely pubescent; three spots at the head, the anterior and lateral margin of the thorax, and two basal spots (sometimes absent) of the latter, flavous; thorax closely punctured; elytra strongly punctured, flavous, the suture and two transverse narrow bands connected with a lateral longitudinal stripe, black; legs fulvous. Length, 2 lines.

Head rather closely punctured, finely pubescent, longitudinally depressed at the vertex, black, two spots above the eyes and the epistome bright flavous; antennæ two-thirds the length of the body, the lower five joints fulvous, the others black; thorax subcylindrical, much narrowed in front, the sides strongly deflexed, the lateral margins nearly straight, the surface closely and finely punctured and pubescent, black, the anterior and lateral margins flavous (the former narrowly widened at the middle, the latter widened at the angles); scutellum scarcely raised, slightly longer than broad, its apex truncate, black; elytra sparingly clothed with short yellow pubescence, closely and strongly punctate-striate, flavous, with a narrow black transverse sinuate band before and another below the middle connected with the black suture, and a similarly coloured stripe running parallel to the lateral margin,—this latter band does not extend to the apex; pygidium black, its lower edge flavous; the under side black, the anterior coxæ and the legs fulvous, the femora pale flavous at their apex.

C. flavopictus resembles much in its coloration *C. pustulatus*, Ross, and allied forms, but differs in the finely pubescent upper surface, and in the close and somewhat elongate punctuation of the thorax; the two basal spots in front of the scutellum are frequently absent; the elytra in the male insect show deep rows

of punctures with more finely punctured interstices, while these latter in the female are as deeply punctured as the rest of the punctures; the flavous colour of the elytra forms three spots on each, placed one at the base, the second at the middle, and the third at the apex; the lateral black stripe is rounded in front of each of the flavous spots.

Several specimens.

CRYPTOCEPHALUS DISCOIDALIS, n. sp.

Black; the head (the vertex excepted), the sides of the thorax and the anterior femora fulvous; thorax impunctate; elytra violaceous-blue, strongly punctate-striate. Length, $1\frac{1}{2}$ line.

Head impunctate, obscure fulvous, the vertex piceous; labrum black; the lower five joints of the antennæ fulvous, the basal joint piceous above, the others black; thorax short, nearly three times broader than long, the lateral margins very slightly rounded, the angles acute, the surface smooth and shining, fulvous with a discoidal lozenge-shaped black spot from the base to the apex; scutellum raised, black; elytra dark blue, regularly punctate-striate, the punctures diminishing in depth towards the apex, the interstices somewhat rugose at the sides, the shoulders prominent, sub-tuberculiform; pygidium and under side black; anterior femora and the prosternum fulvous, the latter ending into a sharp point at each side.

The above description is that of the female insect; a single male now before me has a rather deep longitudinal and punctured depression at the vertex, and the thorax is nearly entirely black, the sides being broadly and the anterior margin narrowly flavous; the punctuation of the elytra is rather more strongly impressed. This small *Cryptocephalus* resembles certain varieties of *C. albo-scutellatus*, Suffr., but differs in the flavous anterior femora, the stronger elytral punctuation, and in the shape of the prosternum.

DIORYCTUS NIGRIPENNIS, n. sp.

Fulvous; the terminal joints of the antennæ piceous; head finely punctured; thorax impunctate; elytra black, finely punctate-striate. Length, 2 lines.

Broadly subquadrate, robust; the head rather closely and very finely punctured, fulvous; eyes broadly and subangulate emarginate; antennæ short, the lower five joints fulvous, the others fuscous slightly widened; thorax strongly narrowed in front, the sides evenly rounded and very narrowly margined, the posterior angles acute, the posterior margin slightly sinuate and produced into a point at the middle, the surface not visibly punctured, fulvous, shining, the extreme basal margin black; scutellum not visible; elytra broadly subquadrate, their apex broadly rounded, the basal lobe obliquely produced at the middle, the disc with ten rows of fine punctures, black, the interstices flat and impunctate; under side and legs fulvous; prosternum much broader than long; the anterior margin produced into a distinct tooth at the middle, the posterior margin concave at each side.

Hab. China (coll. Jacoby).

A single specimen of this proportionately large-sized species is contained in my collection from China without precise locality.

(To be continued.)

DESCRIPTIONS OF CHINESE SPECIES OF THE HOMOPTEROUS FAMILY CICADIDÆ.

BY W. L. DISTANT.

I AM indebted to the kindness of Mr. J. H. Leech for a small but very interesting collection of Rhynchota made by his collector in China. This collection proved most opportune material for my Monograph of the Eastern Cicadidæ, as although I had examined most of the large Continental collections, and amassed considerable material myself, the Cicadidæ of China were, and still remain, a subject of much conjecture. The three species here described add to our scanty knowledge, and will be subsequently figured in another publication. The remaining portions of the collection I hope to describe shortly in the pages of this Magazine.

CICADA LEECHI, n. sp.

Head black; the eyes, apex and base of front, and a triangular spot on anterior margin of vertex, greenish ochraceous. Pronotum castaneous; the anterior, posterior and lateral margins, a narrow central longitudinal fascia, and two small basal spots, ochraceous; these ochraceous margins and spots more or less edged with black, the posterior margin crossed by three black bands—one central and one near each lateral angle. Mesonotum black, with two broken linear ochraceous obconical basal spots, the lateral margins and the basal cruciform elevation—excluding centre and apices—also ochraceous. Abdomen black, with two slightly oblique white macular fasciæ on each lateral area; outer margins of the tympanal coverings ochraceous. Body beneath, legs and opercula dull ochraceous, the sternum greyishly pilose; the lateral striations to face, the outer margins of coxæ, inner margins of anterior and intermediate femora, and the extreme apices of tibiæ and tarsi black. Tegmina and wings pale hyaline, the venation pitchy; tegmina with the costal membrane pale greenish, the transverse veins at the bases of the second and third apical areas broadly infuscated, and those at the bases of the fifth and seventh areas narrowly infuscated; the bases of the wings narrowly pale greenish. The opercula are long,—about extending to two-thirds the length of the abdomen,—overlapping internally, their outer margins moderately concave, their inner margins slightly convex, their apices angularly rounded. Long. excl. tegm., ♂, 38 mm. Exp. tegm., 105 to 110 mm.

Hab. China; Wa Shan and Chia Kou Ho.

This species is allied to the Japanese *C. bihamata*, Motsch., but differs by the larger size, the different markings of the body, and the totally different structure of the opercula, which in Motschulsky's species are widely divergent, and not overlapping as in *C. leechi*.

CICADA SINENSIS, n. sp.

Head and pronotum greenish ochraceous; head with a broad black fascia between the eyes; pronotum with two short narrow discal black fasciæ near anterior margin and a black band across the posterior margin near each lateral area. Mesonotum castaneous, with a central tri-lanceolate greenish ochraceous spot with the surrounding area black, a lateral black fascia on each side outwardly margined with greenish ochraceous, the centre and apices of the

basal cruciform elevation black. Abdomen black, with two longitudinal and slightly oblique macular white fasciæ on each lateral area; outer margins of the tympanal coverings ochraceous. Body beneath pale ochraceous, thickly clothed with greyish pile; legs greenish ochraceous. Tegmina and wings pale hyaline, the venation greenish inwardly, fuscous outwardly; tegmina with the costal membrane ochraceous and its outer margin pale sanguineous, the transverse veins at the bases of the second and third apical areas infuscated; extreme bases of the tegmina and wings pale sanguineous. The opercula are short, not extending beyond the basal segment of the abdomen, convexly rounded externally, and slightly overlapping at their inner margins. Long. excl. tegm., ♂ and ♀, 29 to 32 mm. Exp. tegm., 80 to 85 mm.

Hab. China; Chia Kou Ho.

KARENIA CÆLATATA, n. sp.

♀. Head, pronotum and mesonotum pale greenish, sparingly pilose; head with the area of the ocelli, and a spot on each side of base of front, black; eyes brownish ochraceous. Pronotum with two central discal curved fasciæ, which are united posteriorly, and a spot on the lateral margins, black. Mesonotum with two central obconical spots at anterior margin, on each side of which is a larger angulated spot, and a rounded spot at each anterior angle of the basal cruciform elevation, black (these spots are more or less effaced in the typical specimen described); base of the cruciform elevation, a small spot on each side of it, and a spot on each side of the basal margin of the metanotum, black. Abdomen ochraceous, strongly pilose, with three irregular longitudinal fuscous fasciæ,—the central one broadest, those on the lateral areas much angulated and macular. Body beneath and legs greenish ochraceous; a spot at base of antennæ, posterior margin of face, a spot near bases and apices of femora, bases of tibiæ, tarsal claws, and the base and apex of abdomen, more or less black. Tegmina and wings pale hyaline, the venation more or less fuscous; tegmina with the costal membrane greenish, its extreme margin black, the transverse veins at the bases of the second, third, fourth, fifth and seventh apical areas broadly infuscated, and a series of fuscous marginal spots placed on the apices of the longitudinal veins to apical areas; extreme bases of the tegmina and wings ochraceous. Long. excl. tegm., ♀, 30 mm. Exp. tegm., 100 mm.

Hab. China; Chia Kou Ho. 1700 feet. July.

Although I possess but a single *female* specimen of this species, it seems to clearly belong to the genus *Karenia* which I proposed for the reception of a Burmese species some time since. The peculiar structure of the cruciform elevation at the base of the mesonotum, the ulnar vein emitted at extreme apex of basal cell of tegmina, the narrowed head, and short and robust abdomen, all show its generic position, though of course the male structure of the tympana is at present unknown.

NOTES ON HYBOCAMPA MILHAUSERI.

By T. A. CHAPMAN, M.D.

AMONG my earliest entomological ambitions was a desire to become acquainted with this insect, my interest being, I think, excited by Sepp's figure of the larva, and the vernacular name which he gives it, the "Dragon." It is now possible to purchase

the insect alive, and I have thus been enabled to learn something of it, and I find it so remarkable in several particulars as to much more than justify my curiosity. It is not really closely related to any of our Notodontas, but is nearest to the *Ceruras*, with a suspicion of true *Notodonta* (*N. ziczac* and *N. dromedarius*). The egg is large, clay coloured and beautifully zoned, with a dull terra-cotta like surface, apparently free from any structural lines or markings,—really the structure is so much finer than in *Cerura*, that a much higher power is needed to show it,—of a form not very different from that of *C. vinula*. The egg of *C. erminea* is so different from that of *vinula*, that it is, perhaps, not safe to say that that of *H. milhauseri* is not also of a *Cerura* pattern.

By the way, I was struck with the accurate knowledge which Sepp had, 100 years ago, of *Cerura* eggs; describing the brown eggs of *vinula* and *bifida* laid in pairs (or more) on the upper sides of the leaves; whilst *furcula* (and *bicuspis*) are black, and laid solitarily on the under surface of the leaves.

The young larva has grand lateral horns in front and a dorsal row; as he grows older the lateral ones disappear, whilst the dorsal ones remain, though proportionately smaller. I do not propose to describe the larva, which is of course well known, and to which no description without a figure can do justice; but till I saw it alive I could not understand why any larva should have such remarkable angular outlines, curiously conspicuous corners and humps. What the dark young larva resembles I have not ascertained, but by chance I one day brought in with their food so exact a resemblance of the full-grown larva, that there could not be any doubt as to the meaning of all its curious outlines and markings. This was a curled oak leaf, eaten and abandoned by a *Tortrix* (*viridana*?) larva.

This particular leaf was in detail exactly imitated by the larva of *H. milhauseri*. There was a curled portion of leaf with the outline of the body of the larva, the netted green texture of the leaf like the small markings on the surface of the larva, a brown decayed mark or two like the larva has; the extremity was eaten off on lines following partly a rib, so as to imitate the truncate aspect the larva has, however viewed; whilst the secondary ribs of the leaf, being eaten between, projected laterally from the roll just like the dorsal spines of the larva, and in about the same size and order; the tall one in the 5th segment; the dwindling ones in the 6th to 10th; and the taller bifid one on the 12th; this one resembling points from both edges of the leaf. Most curious, perhaps, of all, the little backward projecting points at the tips of the spines (or humps), apparently so superfluously complicated in the larva, were exactly represented in the leaf; the *Tortrix* larva, in eating the substance of the leaf between the secondary ribs, had eaten these down to some extent

also, but stuck fast just at a tertiary branch, the small remaining portion of which precisely represented the backward process of the larval spine. I never met with another rolled leaf that happened in exact number, size, and position, to represent all the processes of the larva as this one did, but any rolled and abandoned leaf bore a very close resemblance to the larva.

The cocoon is the most *Cerura*-like phase of this insect; it is made on the bark of the tree; though rather rounder and not quite so flat, it is in favourable specimens very like a *Cerura* in a similar locality. It differs, however, in several particulars. In its construction the larva first makes a silken net over itself at the site of the cocoon; this is so open and flimsy looking, and so close down on the larva, which is rolled together under it, that it is surprising how the larva can move about inside to continue the work, and how in doing so it does not tear all to pieces. *Cerura*, on the other hand (I have watched *bifida* and *bicuspis*), selects a place for its cocoon, and begins at what will be the tail of the cocoon by making what looks like its head, a little structure like the toe of a slipper; it pushes this end forward, working beneath it by loosening its attachments in front, and pushing its head under, spinning a continuation of it; in this way it gets under and detaches from the surface any bits of lichen and loose fragments of bark, which thus adhere in precisely their natural positions to the surface of the cocoon, and so much help its concealment; and having in this way pushed the front of the cocoon forward to its place, it closes the hinder end, and begins the excavating process by which it obtains the materials to form the outer part of the cocoon of a sort of artificial bark. *H. milhauseri* gets to the surface of the cocoon some colouring matters or lichenous material from the surface of the bark, and puts a little detached material round the margin of the cocoon to make it fit a little; but the face of the cocoon, instead of being like that of *Cerura*, an artificial bark, is almost pure silk of a dense gummy substance, such as I have seen *vinula* make under difficulties when he could get no wood to work with. *Milhauseri* only slightly smooths the bark beneath the cocoon, and covers it with gummy silk. *Cerura* lies in a neatly excavated cavity in the bark with practically no silken lining. Partly by its original close structure, and partly by contraction as it matures, this cocoon fits the pupa more closely than any other cocoon I have met with, so that, combined with its dense horny texture, it is extremely difficult to open it without injuring the contained pupa.

This close fitting of the cocoon to the pupa is related to perhaps the most curious of all the facts I have observed in this species, that is, its method of emergence; which is, I think, perhaps the most remarkable of any of the many remarkable provisions in different Lepidoptera for the escape of the moth from its cocoon.

As the shortest way of describing this process, I will call it cutting out a lid with a sardine opener. *Cerura* bursts an irregular lid, having first softened the place with some fluid, and in many instances the broken lid falls back for a time into its place; the lid is irregular in form, often in several pieces, just as accident decides; but *milhauseri* marks out with his sardine-opener an exact definite lid, of which there is no trace or indication in the construction of the cocoon, and continues cutting on this exact line until the lid is set free. This lid is of oval shape, but with the anterior margin more rounded than the posterior. There is something more to be learnt about the action of this sardine-opener than I have yet ascertained, but I can give a few more particulars. First, as to the implement itself. In the pupa, just in front of the eyes and between the bases of the antennæ, is a deep pit, having at the bases of the antennæ, on either side, a sharp margin, almost a horn; stretching up from below, from the mouth region towards the pit, is a flat surface slightly furrowed and wrinkled, and terminating at the front margin of the deep pit (though one would say at first sight in the middle of it), in a straight spine projecting well beyond the general surface of the pupa, sharply pointed and polished; a slight ridge stretches back from the spine through the pit, and fades out on to the surface of the pupa, so that the pit might be described as a double furrow, stretching from before backwards. This spine is the sardine-opener, and by a lateral rotatory movement of the pupa, which obtains its fulcrum from the tightness with which it is grasped by the cocoon, it traverses over and over again the outlines of the lid till it is cut through.

I have not seen this operation performed, for the reason that when you attempt to see it you stop it; but I have caught the creature actually at work, and can add this further fact, that the spine in some way applies to its line of action a softening fluid, and it is the softened gum that it actually cuts or divides.

The fluid no doubt comes from the same mouth-glands as in other cocoon-softening species, but the precise means by which it is guided by the spine I have not ascertained; whether the pit at its base has anything to do with it I cannot say, or whether this pit is a means of giving this portion of the pupa-case, which includes the eye-covers, a firm attachment to the moth; but very often it remains attached to the moth after the rest of the pupa-case has been pushed away backwards.

The imago is very delicate and easily rubbed, and such a specimen is a very disappointing representative of so curious a life-history; but a specimen in fine condition, from its delicate tints and unusual markings is very pleasing.

Firbank, Hereford.

FAROE ISLANDS.

By REV. F. A. WALKER, D.D., F.L.S., &c.

THE long mountain ranges of the Faroe Islands in full view, with a bank of snowy clouds resting along its whole extent. On nearer approach the islands present a succession of many peaks, some near the sea, others more in the background, with grassy slopes and table land intervening in front. The cliffs of Oster (East) Island wear a majestic appearance, 2200 feet in perpendicular height above the sea that laves their base, and the slopes of shale that have fallen from their weather-beaten surface. Westmanhavn, where our vessel is to make a brief stay, is situate on another island, that of Stromoe. There are also inland cliffs sideways to the sea, some 1600 feet in height, covered from top to bottom with short grass, but presenting too steep a gradient ever to be climbed, and a singular aspect, as cliffs of their steepness are usually bare, with the exception of some grassy ledges. The highest elevation in the Faroes is, I am told, 2800 feet. "Splendid nature!" said the mate of our vessel, as I stood chatting with him on the prospect this beautiful morning; and I heartily concur with him. The cliffs and hills look green after those of Iceland, being clothed with turf up to their very summits; and there is a chasm on the brink of one of them 1000 feet deep, communicating by a narrow fissure on the sea level with the waves. We are now passing between Oster and Stromoe islands, through a very narrow strait, dangerous in stormy weather. Sea caves that can only be approached by water are as numerous on one side of this strait as are watercourses trickling down the slopes on the other.

The church and dwelling houses of Westmanhavn are all built of wood as in Iceland, and there are numerous crops of vegetables on the grassy slopes around, and some patches of barley here, whereas no cereal is seen there. The potatoes, now in full blossom, look remarkably flourishing, as the climate is particularly warm and sheltered round these land-locked fjords, very different from that we have just quitted. I imagine that one cause of the diversity of the temperature is to be found in the great altitude of the Alpine heights environing the Icelandic fjords, and keeping off the sun altogether in the dark days of winter. Here the verdant hills are sufficiently high to shelter the borders of the fjord, but not perpendicular and lofty enough to cast a gloom over it, and retard its products.

Another great cause of the milder climate is no doubt to be attributed to the Gulf Stream. I captured two specimens of *Nebria brevicollis*, and observed our ordinary *Tipula oleracea* once more; also the plants *Narthecium ossifragum* and *Scabiosa*

as with us, but had no time to make further observations as we had to start very shortly again for Thorshavn. As we advance, the fjord widens, the cliffs seem more stupendous, on our right is the open sea, and in front of us are other islands of the Faroe group which we are rapidly approaching.

There are twenty-four islands in all, and one of the easternmost is known as Needle Island, from a cave at one end of the isle forming an aperture right through, and known accordingly as the "eye of the needle." The entrance to Thorshavn is said to be a very ugly one in bad weather, when the S.E. wind prevails. Thorshavn and the fields immediately adjoining appear to me to furnish a link between Iceland and southern civilization. It is true that the Faroe Isles possess no trees except in the garden borders, but in those garden borders there are more and larger currant bushes than in Iceland; and in addition mountain ash trees, willows, sycamores, &c., of fair height; and more garden flowers grown in the open air, including tiger lilies and monkshood. Then again, I see once more some of our common English wild flowers, which are not to be met with, or at all events I have not found, in Iceland, as the daisy and milkwort (*Polygala*). The flowers of the eyebright (*Euphrasia*) are larger than in Iceland, and other wild flowers as *Caltha palustris* more abundant than there. Oats as well as barley are grown at Thorshavn, and the variety and luxuriance of the wild grasses is remarkable. Earwigs and froghoppers, both unseen in Iceland, are beheld once more here. In other respects the Fauna of the two regions would appear to be very similar. Compare the following list of Faroe Island insects, the result of the necessarily brief observation of half a day spent there:—

COLEOPTERA.—*Nebria brevicollis*, Westmanhavn, Thorshavn. *Pterostichus*,* Thorshavn.

DIPTERA.—*Helophilus pendulus*,* Thorshavn. *Scatophaga stercoraria*,* Thorshavn.

LEPIDOPTERA.—*Larentia didymata*,* Thorshavn.

NEUROPTERA.—*Limnephilus griseus*, Thorshavn.

ORTHOPTERA.—*Forficula auricularia*, Thorshavn.

ARACHNIDA.—*Phalangium longipes*,* Thorshavn.

An asterisk is affixed to such species as are also noticed in Iceland. The *Nebria brevicollis* of the Faroes is replaced in Iceland by the slightly smaller but closely allied *Nebria gyllenhali*.

I may add, in conclusion, that the Faroe islanders number about 10 or 12,000, and only seven of their twenty-four islands are inhabited. The climate varies but 7° centigrade between summer and winter.

Dun Mallard, Cricklewood, N.W.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

CONTRIBUTIONS TOWARDS A LIST OF THE VARIETIES OF NOCTUÆ OCCURRING IN THE BRITISH ISLANDS.—As these papers have become somewhat voluminous in character, we have decided to discontinue their publication in the 'Entomologist.' It is understood that the author, Mr. J. W. Tutt, is making arrangements for the re-issue of the early papers, which, together with others in continuation, will appear in book-form. For further particulars apply to Mr. TUTT; Westcombe Park, S.E.

THE LATE MR. F. BOND.—To the list of notes on entomological subjects by the late Mr. Bond, contained in the memoir of him (Entom. xxii. 265), should, I think, be added that he contributed records of his captures in the Cambridgeshire Fens to the entomological portion of 'Fenland, Past and Present' (a bulky volume published in 1878). When engaged in assisting to get together the list of Lepidoptera captured in the district, and therein contained, I visited Mr. Bond at Staines, and Mr. Dunning's charming description of his visit might well apply to my own. But unfortunately my object prevented but the most cursory glance at Mr. Bond's rich collection of insects. He had written to me to come early, so I was at his home by an early hour in the morning, and my visit lasted till past ten at night, and has left a delightful memory of a kindly enthusiast, brimful of practical knowledge. I took down with me an early proof of the list, and we went through it *seriatim*, putting in Mr. Bond's localities and additional species. What this indicates may be gleaned from the text of the work, where it is stated that "upwards of fifty species, otherwise not recorded in the district, and the greater portion of which have probably become extinct," were then added by Mr. Bond, "besides much additional information as to other species." This information he gave almost entirely from memory, interspersed with reminiscences of the circumstances attending the capture of the species. He rarely referred to notes, and when he did so,—generally as to a question of date,—it was to an interleaved copy of Stainton's 'Manual,' which appeared to contain notes and dates of most of his interesting captures. This copy must be very valuable, and should not be lost sight of. When the additional matter was in type I sent it to Mr. Bond, and he again went through it and checked it, the result being that the work contains a permanent record of Mr. Bond's most interesting captures in the district, and it is well known that he was by far the most assiduous and successful collector in the rich fenlands of Cambridgeshire and Huntingdonshire before the great drainage schemes changed the face of the country. As an instance of Mr. Bond's reticence in publishing his captures may be mentioned that at the time the claim of *Argyrolepis schreberiana* to be British rested upon the single specimen taken at Yaxley by Mr. Bouchard, and published in the 'Entomologist's Annual' of 1855, Mr. Bond took about a dozen specimens at Wicken, which were unrecorded. Mr. Bond explained to me the locality, and being an out-of-the-way spot, not likely to be visited, he said he felt certain the insect was still there. This has received confirmation by its capture in recent years. Among notable insects which Mr. Bond was the first to discover may be mentioned *Macrogaster castaneæ (arundinis)*, *Tapinostola hellmanni*, and *Nonagria neurica*, and the larvæ of *N. cannae* and *Noctua subrosea*. Among the Micro-Lepidoptera Mr. Bond also worked most successfully,

and in the genus *Gelechia* alone discovered at Wicken and Yaxley Fens four new species—*divisella*, *palustrella*, *oblitella*, and *subdecurtella*.—ALFRED BALDING; Wisbech.

THE REVIVAL OF THE 'ENTOMOLOGIST'S ANNUAL.'—I desire most heartily to endorse the wishes expressed in the remarks of the Rev. O. P. Cambridge, under this head (Entom. 65), that some system ought to be arrived at for rendering available to entomologists generally the many very useful notes, and even results of research, at present practically lost by reason of being hidden away in the publications of the numerous Field Clubs and Natural-History Societies of the provinces. The entomologist who makes a "science" of the study of insects takes, as a rule, one of two main lines of research. Either he will devote himself to the investigation of the habits, &c., of a special insect or group of insects, or else to that of ascertaining what individual insects exist within a given defined area, be that large or small. Now for either of these purposes a ready means of reference to what has already been done by others, in a similar direction, would be invaluable. Having myself for some years been the editor of the Journal of a provincial Field Club, I have become aware of the fact that much more really useful work is done in one or other of the above-named directions than many would suppose. At a Special Meeting of the Entomological Society in May, 1883, when the Bye-Laws were being altered, I brought this subject before the Society, considering it would be a great inducement to many to become Fellows. I then suggested the possibility of a system of abstracts being made and added to the Journal, as is done by the Chemical Society. I still hope it may yet be carried out somewhat in the manner suggested by the Rev. O. P. Cambridge, and I feel sure that all Secretaries of Field Clubs, &c., would willingly supply the copies of such of their Journals as contained papers on entomological subjects.—ALFRED LLOYD; The Dome, Bognor, Feb. 6, 1890.

HESPERIA LINEOLA IN JERSEY.—On July 21st, 1871, I paid a visit to Jersey, where I took three specimens of an *Hesperia*, which have since remained in my cabinet, labelled *H. linea* (*thaumas*). On reading Mr. F. W. Hawes' note on his interesting discovery (Entom. 3), I sent him the specimens for comparison, and he informs me that they are undoubtedly *Hesperia lineola*, and resemble the specimens in the Doubleday collection in being of a browner hue than those captured by himself in 1888.—W. A. LUFF; 12, Mansell Street, Guernsey.

HESPERIA LINEOLA.—Would it not be as well that before the summer comes there should be published, in *parallel columns*, the precise points of difference between *H. thaumas* and *H. lineola*? I have been informed that when thoroughly understood the differences are sufficient to enable the insects to be distinguishable in the field, or at all events in the net. This might save the heedless and needless destruction of thousands of innocent butterflies, very beautiful to the lover of nature, and, I believe, quite innocent of any injury to man. Otherwise, it is much to be feared there will, in a few months' time, be a general slaughter of every *thaumas* in the country, in the hopes of taking "the last new thing."—ALFRED LLOYD; The Dome, Bognor, February 6, 1890.

[In his remarks on and comparison between these two insects, Mr. Hawes has been so explicit, that unless those who may go on the war-path

against the "Skippers," during the next season or two, are determined to slay all and spare none, our well-known friend *thaumas* should suffer no more inconvenience than that which may be caused him by capture and a brief inspection. However, that nothing may be left undone that could in any way tend to prevent unnecessary destruction, the following differential synopsis is given;—

H. thaumas.

1. Tips of antennæ yellow beneath.
2. Central black streak of male slightly curved to inner margin.
3. Hind wings beneath, inner margin fulvous.

H. lineola.

1. Tips of antennæ black beneath.
2. Central black streak of male short, straight, and sometimes interrupted.
3. Hind wings beneath, inner margin not fulvous.

1 and 3 refer to both sexes, 2 to male sex only.—ED.].

HESPERIA LINEOLA: A CORRECTION.—There is a mistake in my note (Entom. p. 57). "On the marshes near Purfleet, Shoeburyness," should read, "on the marshes near Benfleet and Shoeburyness.—F. G. WHITTLE.

GAS-LAMP ENTOMOLOGY.—With reference to Mr. Arkle's remarks concerning the entire absence of the genus *Taniocampa* at gas-lamps (Entom. 62), it may be of interest to record that towards the end of April, 1887, *Taniocampa stabilis*, *T. incerta*, *T. gothica*, and *T. pulverulenta*, were all common on the gas-lamps in this neighbourhood, together with a few *T. munda* and *Pachnobia rubricosa*. — R. M. PRIDEAUX; 9, Vyvyan Terrace, Clifton, Bristol.

In view of Mr. Arkle's statement that he has never taken the genus *Taniocampa* at gas-lamps, the following observation may be interesting. Some seasons ago I took a good number of *Pachnobia rubricosa* (or *Taniocampa rubricosa* according to Doubleday's list), on gas-lamps in Lancashire; but no other members of the *Taniocampa* genus came to light, although several others occur in the neighbourhood. It would thus appear that the species *P. rubricosa* is more correctly placed in the 'Entomologist' list than in the old list.—J. E. R. ALLEN; Nantelwyd House, Ruthin, N. Wales.

I am rather surprised to find, from Mr. Arkle's notes on "Gas-lamp Entomology (Entom. p. 62), that he has never captured a single *Sphinx* at light. My own experience of this branch of collecting has been exceedingly small; but on one of the few occasions when I attended to it, I found a fine *Smerinthus ocellatus*, clinging tenaciously to the outside of a gas-lamp at Tottenham. Moreover, Dr. Knaggs, in his 'Guide,' refers to the "absurd habit" that the *Smerinthus* have of creeping up underneath the lamp, and also states that *atropos*, *convolvulus* and *galii*, have been known to enter houses attracted by the light. Kirby too ('European Butterflies and Moths'), states that *A. atropos* is attracted by light. Evidently, therefore, the Sphinges are habitually light-seekers, and it certainly seems very strange that Mr. Arkle's experience has been uniformly negative of this fact; it would be somewhat interesting to hear from other collectors as to their luck. I have some recollection of reading that *M. stellatarum* has been known to come to light, but I cannot locate my authority. — F. H. PERRY COSTE; "Ravenshoe," Burnt Ash Hill.

Additions to my list (Entom. 64):—March, *T. hyemana*; October, *L. phryganella*.—J. ARKLE; Chester.

THE ELECTRIC LIGHT AT TAUNTON.—Seeing the numerous accounts of the failure of sugar last year, the better success I had at light struck me as peculiar. From the middle of May to the end of September I went out as nearly as possible every night, and even on the coldest and wettest of nights I never failed to see an insect of some kind. Among the 200 odd species I took at light during the year are:—*S. ligustri* and *S. convolvuli*, *C. porcellus* and *C. elpenor* and the three *Smerinthi*; of the Bombyces, *H. bicolorana*, *L. lurideola*, *G. quadra*, *A. villica*, *S. mendica*, *H. humuli*, *H. lupulinus* and *H. hectus*, *C. ligniperda*, *Z. pyrina*, *D. pudibunda*, *P. populi*, *L. quercifolia*, *D. lacertinaria*, *D. falcataria*, *D. binaria* and *D. cultraria*, *D. furcula*, *D. bifida* and *D. vinula*; *S. fagi*, *P. palpina*, *N. dictæa*, *N. dromedarius*, *N. ziczac*; of the Noctuæ, *T. derasa*, *C. octogesima*, *A. diluta*, *B. muralis*, *D. coryli*, *A. ligustri*, *N. arundinis*, *H. micacea* and *H. petasitis*, *N. reticulata*, *M. persicariæ*, *M. literosa* and *M. bicoloria*, *G. trigrammica*, *A. saucia*, *N. plecta*, *T. fimbria*, *T. orbona*, *X. fulvago* (*cerago*), *C. ærampelina*, *C. diffinis*, *P. flavicincta*, *H. pisi* and *H. genistæ*, *C. umbratica*, *P. iota*, *P. chrysitis*, *H. uncula*; and among the Geometræ, *C. apiciaria*, *M. margaritaria*, *P. syringaria*, *E. alniaria* and *E. fuscantaria*, *G. papilionaria* and *G. vernaria*, *H. strigata*, *B. piniaria*, *T. dubitata* and *E. certata*. Some moths, which are plentiful in the woods around, do not come to light, as, for instance, *T. batis* and *A. pyramidea*. The last-named is very common, but I only took one example at light. I also secured a specimen which I put down to be a variety of *M. fluctuata*; the large dark blotch in the centre of the margin of the upper wing is absent. Early in the spring, an example of *A. atropos* was taken, and in 1888 four *D. galii*. Unluckily they had found their way into the globes, and were a bit damaged.—M. FARRANT; 74, Cambridge Street, Pimlico, S.W.

[At the December meeting of the London Entomological Society, Colonel Swinhoe stated that in Bombay he had collected more than 300 specimens of Sphingidæ by means of the electric light. Mr. J. J. Walker, R.N., said that at Panama he found the electric light very attractive to insects. Mr. M'Arthur, who has just returned from India, informs me that in passing through the Suez Canal he noticed numbers of moths, many of large size, darting about in the beam of the electric light, which was worked from a sort of cage suspended over the bow of the ship.—R. S.]

EPIONE PARALLELARIA VAR.—At the foot of the recorded capture of a variety of *Epione parallelaria* which appears in the January number by Mr. Hewett, is to me a rather astonishing note by the editor, who says:—"This variety is more commonly bred than captured; some years not unfrequently." Having bred and collected this species for many years,—and I believe the experience of other York collectors will confirm me,—I must say that I have never heard of one of this variety having been bred before. This form is figured, Entom. xi. pl. 2, fig. 3. and is recorded at p. 170 of that volume as having been captured by the late Mr. Prest, on the 13th July, 1874, at its haunt near Strensall. Further mention is made of several others taken in previous seasons near the same spot, pointing to an hereditary form. Mr. Anderson and Mr. Jackson, of York, have, I believe, both captured it. There is one in the Allis' Collection in the Yorkshire Philosophical Society's Museum in this city, which looks by its rather worn

appearance, like a captured specimen; and also the one in my collection, the capture of which was recorded in Entom. xvi. p. 211. My variety, I believe, is in finer condition than any of those previously recorded; the dark purple border is strikingly intensified. I remember, in a conversation with Mr. Prest, when he came to look at my specimen (which he described as the best he had seen), saying that all examples of the variety in question had been taken close to a hillock at Sandburn, and I believe Mr. Hewett's specimen was captured within a few yards of where the others were taken. There are several pretty forms of *E. parallelaria* bred as well as captured; indeed, most of the York entomologists possess something unique in markings of the species, but I believe the natural variety, which has the centre of the wings dark brick-red, without the reticulated markings, but with the border purplish black, is exceedingly scarce. All the examples of this form have been captured about one particular spot, which seems to point to the existence of a distinct local race.—S. WALKER; 75, Union Terrace, York, January 20, 1890.

[The note referred to should have been signed J. T. C., not ED.].

LEPIDOPTERA TAKEN IN DORSETSHIRE IN 1889.—Although rather late in the day, the following records from this district will not perhaps have lost all their interest. The general character of the season here last year, —1889, closely corresponded to that of so many other localities, being about the worst I have ever known. There seemed a good promise at the end of May and during the first week in June, but soon after that a plague of larvæ of several species completely devastated the young foliage over large areas of coppice and timber, and thenceforward there succeeded an almost complete dearth of insects. Busy among the devastating larvæ were numerous Ichneumonidæ, chiefly, as far as I could observe, one almost entirely black species. To this cause perhaps it was due that the common green oak Tortrix, *T. viridana*, was not very abundant, though quite common enough; the succeeding brood, however, of *Hibernia defoliaria*, *H. aurantiana*, and *Cheimatobia brumata*, I have never seen exceeded in numbers. Among the latter species of Lepidoptera we meet with, I may mention *Pterophora paludum*, Zell. After many visits to its localities I met with one example of each sex in good condition, on the 29th of August; no others were seen or taken. It did not appear at all in 1888, at any rate we did not meet with it, though its localities were well worked. In 1886 and 1887 (Entom. xix. p. 256, and xx. pp. 308, 326), we took it in tolerable abundance. All our efforts to find the larvæ or pupæ have as yet proved unavailing. *Psoricoptera gibosella*, which was plentiful on trunks and branches of oak-trees in 1888, did not appear in 1889. *Chauliodes illigerellus*; two fine specimens were bred from larvæ in united blossoms of *Angelica sylvestris* late in August. *Cerostoma lucella*, about twenty examples, sixteen of which were beaten from one oak-bush at different times between July 9th and September 1st; the rest were beaten from oak near the same spot, excepting one which was flying in sunshine and settling on the blossoms of the bull-daisy, in a rough field at some little distance. *Cerostoma alpella* occurred but rarely in the same locality, though in greater abundance than *C. sylvella*, which is usually the more common species. *Elachista paludum*, one example on a bog on the heath. *E. monticola*, in a swampy spot, appeared to be pretty frequent. These two have not been before recorded from Dorsetshire. *Laverna subistrigella*, one, in a rough field. *L. lacteella*, three in the same field as the last species, at the end

of June, 1887. The four last species have been determined by Mr. Stainton. Specimens of *L. paludicola* have hitherto done duty in my cabinet for *L. lacteella*, about which last little appears to be known among entomologists generally. *Trifurcula atrifrontella*, one caught on the wing in a wood about the end of June. This also has been examined and determined by Mr. Stainton, who speaks of it as "a great rarity." *Apatura iris*, female, the first I have seen in this district; the species has not been recorded in Dorsetshire since 1841. *Plusia orichalcea*, a fine specimen taken by my friend Mr. J. J. Dunn Cooke, at Hyde, near Bloxworth, about the middle of July. *Eupithecia dodoneata*, several examples in May and June. Near Weymouth it appears to have been quite abundant last spring. *Catoptria albersana*, one taken, several seen. *Euchromia purpurana*, one taken. *Lobesia reliquana*, fairly abundant. *Eupæcilia nana* several. *Tinea semifulvella*, one. *Depressaria pupurea*, one beaten out of thatch in August. *Æcophora fulviguttella*, several. *Gracilaria elongella*, several. *Lita costella*, one (the first there met with), in a swampy spot, the first week in September. *Pæcilia nivea* (= *gemmella*), frequent, but not in anything like its usual abundance. *Doryphora oblitella*, several in a bog on the heath. In some seasons it is fairly common. *D. lucidella*, one; not met with before in this district. *Bryotropha umbrosella*, tolerably abundant, Chesil Beach, Portland, beginning of July. *Stimonota puncti-costana*, one flying in a wood in June. This is its first record in this county. I have not thought it necessary to arrange the above species in any systematic order, but have taken them at random, while looking over my notes of the season.—O. P. CAMBRIDGE; Bloxworth Rectory, February 7, 1890.

A CURIOUS BLUNDER.—Lord Walsingham's recent remarks on the ignorance of the public on entomological subjects have met with a curious confirmation. A writer in one of our first medical journals, speaking of the tarantula, pronounced it a "harmless beetle" (*sic*). When a medical graduate thus confounds Arachnida and Coleoptera, what may we not expect from the general public?—J. W. SLATER; 36, Wray Crescent, Tollington Park, N.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*February 5th*, 1890. — The Right Hon. Lord Walsingham, M.A., F.R.S., President, in the chair. The President announced that he had nominated Mr. J. W. Dunning, M.A., F.L.S., Captain H. J. Elwes, F.L.S., and Mr. Frederick DuCane Godman, M.A., F.R.S., Vice-Presidents for the Session 1890—1891. Mr. B. A. Bristowe, of Champion Hill, S.E.; Mr. J. E. Eastwood, of Witley, Surrey; Mr. A. B. Farn, of Stone, Greenhithe, Kent; and Mr. O. Goldthwaite, of Leyton, Essex, were elected Fellows; and Mr. R. S. Standen was admitted into the Society. Mr. F. D. Godman exhibited a specimen of *Papilio thoas*, from Alamos, in the State of Sonora, Mexico, showing an aberration in the left hind wing. Mr. R. Trimen remarked that butterflies of the genus *Papilio* were seldom liable to variation. Mr. Charles G. Barrett exhibited a series of specimens of *Phycis subornatella*. Dup., from Pembroke, the east and west of Ireland, the Isle of Man, and Perthshire; and a series of *Phycis adornatella*, Tr., from Box Hill, Folkestone, Norfolk, and Reading; also a number of forms intermediate between the above,

taken in the Isle of Portland by Mr. N. M. Richardson. He said that these forms proved the identity of the two supposed species, which he believed were both referable to *P. dilutella*, Hb. He also exhibited specimens of *Hesperia lineola*, and a pale variety of it taken in Cambridgeshire by Mr. H. W. Vivian; specimens of *Epischia banksiella*, a recently-described species, taken by Mr. N. M. Richardson in Portland; and a specimen of *Retinia margarotana*, H.-S., a species new to Britain, discovered in Mr. Hodgkinson's collection amongst a number of *Retinia pinivorana* which had been collected in Scotland. Mr. W. H. B. Fletcher showed a series of *Gelechia fumatella* from sand-hills in Hayling Island and near Littlehampton, and, for comparison, a series of *G. distinctella*, from the same places. He also showed a few bred specimens of *G. terrella*, and a series of preserved larvæ. He stated that on the downs the larvæ live in the middle of the tufts of such grasses as *Festuca ovina* and allied species, and that on sandhills where herbage is more sparse, they make silken galleries under stones, and sally forth to eat blades of grass growing near their homes. Mr. H. Goss read a communication from Dr. Clemow, of Cronstadt, St. Petersburg, on the subject of the coincidence of vast flights and blights of insects during the years 1510, 1757, 1763, 1782, 1783, 1836 and 1847, and the epidemic of influenza. During the year 1889 no unusual activity in the insect world had been recorded. Mr. H. T. Stainton and Mr. M'Lachlan made some remarks on the subject, the purport of which was that there was no connection between epidemics and the occurrence of swarms of insects. Mr. G. A. J. Rothney communicated "Notes on Flowers avoided by Bees." It appeared, according to the author's observations, made in India, that dahlias were exceptionally attractive, but that the passion-flower was only resorted to by a few species of *Xylocopa*; and that, with one exception, he had never seen any insects feeding on the flowers of the oleander. Mr. Slater, Colonel Swinhoe, Mr. Trimen, Lord Walsingham, and Mr. M'Lachlan took part in the discussion which ensued. Dr. D. Sharp read a paper entitled "On the structure of the Terminal Segment in some male Hemiptera." Colonel Swinhoe read a paper entitled "On the Moths of Burma," which contained descriptions of several new genera and 107 new species. Dr. F. A. Dixey read a paper entitled "On the Phylogenetic Significance of the wing-markings in certain genera of the *Nymphalidæ*." A long discussion ensued, in which Lord Walsingham, Mr. Jenner Weir, Capt. Elwes, Mr. Trimen and others took part.—H. Goss, *Hon. Sec.*

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—February 6th, 1890.—J. A. Clark, F.E.S., President, in the chair. Messrs. A. Quail, J. A. Simes, and W. Cook were elected members of the Society. Mr. Raine exhibited specimens of preserved larvæ, including a fine variety of that of *Phalera bucephala*, L. Mr. G. Bryant, preserved larvæ and pupæ of *Apatura iris*, L., *Papilio machaon*, L., *Limenitis sibylla*, L., and *Nemobius lucina*, L. Mr. Whittle, a variety of *Epinephele ianira*, L., having the left hind wing nearly bleached. Mr. J. A. Clark, 24 species of Tineina; also currant-stems, showing ravages of larvæ of *Sesia tipuliformis*, Clerck. Mr. J. W. Tutt exhibited photographs of a number of varieties of *Arctia caia*, L., and *A. villica*, L., *Spilosoma menthastri*, Esp., and *S. lubricipeda*, Esp., and *Abraxas grossulariata*, L., the extent of variation being of much wider range than either he or any of the members present

had ever seen in English collections. He also remarked on the recent discovery of *Hesperia lineola* Ochs., which hitherto had been passed over as *Hesperia thaumas*, Hufn., in Britain. The same member, referring to Mr. O. Goldthwaite's exhibit of Lycænidæ, pointed out the similarity of these and other Continental species to Lepidoptera indigenous to this country, and considered, that as the latitude, climate, and geology were nearly identical, other species might have been overlooked. In Coleoptera, Mr. Cripps exhibited Plymouth species. Mr. Heasler, *Dromius 4-notatus*, Panz. Mr. Bellamy, *Hydrophilus piceus*, L., *Dytiscus punctulatus*, F., *Molytes coronatus*, Goeze, and *M. germanus*, L. Mr. Milton, *Carabus nitens*, L., and *Trichius fasciatus*, L. Mr. G. A. Lewcock reported on the Coleopterous species prevalent in 1889, giving an account of the insects obtained by him at Chattenden, including *Brachytarsus scabiosus*, F., *Tillus elongatus*, L., *Anthribus albinus*, L. (by Mr. Cripps), and 40 specimens of *Malachius æneus*, L.; at Rainham (Essex), *Geodephaga* were plentiful in early spring; at Epping Forest aquatic species were abundant in both spring and autumn, and several specimens of *Dytiscus punctulatus*, F., *Hydrous caraboides*, L., *Ilybius ater*, De G., &c., were among the captures; many species were also obtained from Farnham, Esher, Woking, and other localities.—G. A. LEWCOCK, E. HANES, *Hon. Secs.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—January 20th, 1890.—Mr. W. E. Blatch, President, in the chair. The Rev. Chas. F. Thornehill exhibited *Acidalia immorata*, also *Noctua festiva* var. *conflua*, the latter being from Scotland. Mr. C. J. Wainwright showed *Cabera rotundaria*, from Sutton Park. Mr. H. Tunaley read a paper on the entomology of Porlock, in Somersetshire and the neighbourhood, giving a good description of the place, and a list of the Lepidoptera taken, which included some rare species. The insects captured were exhibited.

February 3rd. — Annual Meeting.—Mr. W. E. Blatch in the chair. The report of the Council for the past year was very satisfactory, showing a considerable amount of work done in this their first year. The Treasurer's report was read, which showed a slight balance in hand. The following gentlemen were elected as officers for the ensuing year:—Mr. W. E. Blatch, President; Rev. Charles F. Thornehill, F.E.S., Vice-President; Mr. R. Bradley, as Treasurer; and Mr. C. J. Wainwright, as Secretary, the remaining members of the Council being Messrs. W. E. Lee and E. C. Rye.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

OBITUARY.

ARTHUR BLISS died January 29th, 1890, at the early age of 32 years. For some time past his health had been far from robust, but the immediate cause of his death was pneumonia supervening on influenza. Mr. Bliss was a member of the South London Entomological and Natural History Society from 1874, and at one time ably discharged the duties of secretary to that body. In March, 1885, he was elected a Fellow of the Entomological Society of London. Although specially interested in the lepidopterous fauna of his own country, he also formed a collection of tropical species, but, with the exception of a few observations recorded in the 'Entomologist,' he does not seem to have contributed much to the literature of his study.

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[No. 323.

ON AN ADDITIONAL AID TO THE DETERMINATION OF CERTAIN BRITISH GYRINIDÆ.

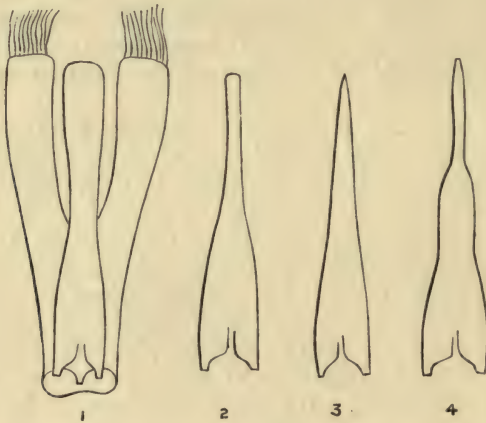
BY JAMES EDWARDS, F.E.S.

IN the case of a genus like *Gyrinus*, where so much difference of opinion exists amongst authorities as to the value of the specific characters hitherto in use, one experiences an amount of gratification more than ordinary in calling attention to a structural character comparatively easy of observation and practically constant; I allude to the contour of the median lobe of the cedeagus.

In dealing with the Homoptera-Cicadina I have long been accustomed to make use of this character in cases where the other characteristics available are difficult to appreciate or otherwise unsatisfactory, and in certain groups I have frequently succeeded by its means in definitely limiting species, which it was otherwise almost impossible to characterize intelligibly. Under these circumstances I, not unnaturally, place its value as a differential specific character very high, mainly on account of the infinitesimally small amount of variation which it presents in the individuals of those assemblages of insects which we are accustomed to call a species. Its value, however, is by no means uniform, and each case must be judged entirely on its merits. For instance, there are many species of *Typhlocyba* whose identity may be decided from an inspection of this part alone; while, on the other hand, it would be impossible to refer the same organ from several species of *Limotettix* to the species to which they belonged, on account of their great similarity *inter se*; and it is worthy of remark that the latter insects would probably be readily separable by differences in colour and facies, whilst the former resemble one another so closely in those respects that they can only be identified with certainty by a reference to the male genitalia. These examples are taken from the Cicadina; but so

far as I am at present able to judge, the result in the Coleoptera will be very much the same.

As observable in dried specimens, the *œdeagus* of *Gyrinus* is a corneous body consisting of a median and a pair of lateral lobes, found between the dorsal and ventral surfaces of the last abdominal segment; for a short distance from its base it is somewhat oval in section and parallel to the long axis of the body, but its parts are abruptly and obliquely bent upwards to follow the curve of the last ventral segment. The side lobes, the form of which does not vary in any marked degree in the several species, have the basal half of their inner faces excavated for the reception of the basal half of the median lobe; their apical half is flattened and blade-like, and their apices are fringed with long cilia. The form of the median lobe is various, and peculiar to the respective species; its contour in some of our species may be gathered from the outline figures. The latter are made from specimens in Canada balsam, and magnified 40 diameters; but in the Table of Species I have described its appearance when merely dissected out and viewed from above with a hand-lens magnifying about 20 diameters.



1, *œdeagus* of *Gyrinus elongatus*. 2, Median lobe of *œdeagus*, *G. opacus*;
3, of *G. marinus*; 4, of *G. bicolor*.

As it became necessary, in the preparation of this paper, to re-examine the British species of *Gyrinus*, I have thought it well to include some general observations, with a Table of our species to facilitate their determination.

It is evident that we have in Britain two kinds of *Gyrinus* with the reflexed margins of the thorax and elytra testaceous and the interstices of the latter sculptured; in one of these (a)

the interstices are very finely but distinctly punctured, and in the other (*b*) the same parts are transversely substrigose. Although these insects have been in our lists for more than twenty years, there is still much diversity of opinion as to the names to be applied to them. Dr. Sharp, in introducing the insects in question in his valuable paper on the "British Gyrinidæ" (Ent. Mo. Mag. v. pp. 57, 58), adopts the name *caspius*, Aubé, for *a*, and *colymbus*, Er., for *b*; but *caspius*, Aubé, which according to authors = *caspius*, Mén., should have smooth interstices, whilst in *colymbus*, Er., the same parts should be extremely finely punctured. Dr. Regimbart is a great authority on these insects, and doubtless has some good reason for treating the two forms under consideration as one species, but certainly none appears from his Monograph; nor is it clear why the name *caspius*, originally given to a form with the interstices smooth, should be applied to insects exhibiting respectively two kinds of sculpture on the interstices. Canon Fowler, in 'Col. Brit. Islands' (vol. i.), includes both forms under the name *caspius*, Mén., at p. 212, and at p. 214 he deals with them under the name *colymbus*, Er. After copying Regimbart's synonymy and translating that author's description of *caspius*, Mén., he proceeds to examine the characters laid down by authors for *colymbus* and *caspius*, and concludes by very properly proposing a distinctive name for the form *b*. Under all circumstances it seems to me better to adopt the name *colymbus*, Er., for *a*, and *striolatus*, Fowler, for *b*; at all events until it is shown, more conclusively than at present, that they ought to bear some other. I have been unable to obtain males of either of these species for dissection, but I have a female of *colymbus*, Er., taken by myself in the Norwich district. This insect was, until recently, standing amongst my specimens of *natator*, where it attracted my attention by its less convex form, and the straighter sides and more evident outer apical angle of its elytra.

In re-defining the species which he calls *caspius*, Ménétr., at p. 259 of his Monograph, on the challenge of M. de Borre, Dr. Regimbart omits all mention of the form with the interstices substrigose. The former writer seems to think that the *caspius* of Regimbart, with its varieties, and *suffriani*, Scrib., are forms of *natator*, Scop., and he appears to base his opinion on the fact that it is not impossible in some, perhaps in most, specimens of the species last named, with an amplification of about 40 diameters, to detect feeble traces of very fine punctuation. For all practical purposes, however, the interstices of *natator* may be regarded as impunctate. M. de Borre says that he has found all the intermediate forms between *caspius* and *natator*, which, assuming that his *caspius* is the same as that of Aubé, is intelligible enough; for it is not clear how the genuine *caspius* of that

author is to be separated from *natator*. With regard to the question of the specific identity of *suffriani* and *natator*, the views of M. de Borre are scarcely likely to be largely adopted. Such matters as these might be well decided by a reference to the male genitalia.

TABLE OF SPECIES.

- | | | |
|----------|--|--------------------------------|
| 1 (4). | Under side wholly testaceous. | |
| 2 (3). | Scutellum with a broad well-defined keel at the base. Upper side dull | 1. <i>minutus</i> , Fab. |
| 3 (2). | Scutellum simple. Upper side very shiny | 2. <i>urinator</i> , Ill. |
| 4 (1). | Under side wholly or in greater part black. | |
| 5 (6). | Punctures of the inner striæ becoming stronger towards the base | 3. <i>suffriani</i> , Scrib. |
| 6 (5). | Punctures of the inner striæ becoming finer towards the base, or uniform. | |
| 7 (16). | Reflexed margins of thorax and elytra testaceous. | |
| 8 (11). | Interstices sculptured. | |
| 9 (10). | Interstices closely and very finely punctured | 4. <i>colymbus</i> , Er. |
| | <i>caspius</i> , Sharp; Regimbart, pars; Fowler, pars; nec Mén., nec Aubé. | |
| 10 (9). | Interstices transversely sub-strigose | 5. <i>striolatus</i> , Fowler. |
| | <i>colymbus</i> , Sharp; nec Er. | |
| | <i>caspius</i> , Regimbart, pars; nec Mén., nec Aubé. | |
| 11 (8). | Interstices smooth. | |
| 12 (13). | Form ovate. Length of elytra one-seventh (♀) to one-fourth (♂) greater than their joint width | 6. <i>natator</i> , Scop. |
| 13 (12). | Form oblong-ovate, or even elongate and compressed. Length of elytra one-third, or more than one-third, greater than their joint width. | |
| 14 (15). | Average size smaller. Outer apical angle of elytra obtuse but evident. Mesosternum and apex of abdomen rufo-testaceous. Dorsal aspect of median lobe of cœdeagus strap-shaped, slightly narrowed to its broadly rounded apex, a little below which its sides are very slightly concave ... | 7. <i>elongatus</i> , Aube. |
| | | <i>distinctus</i> , Sharp. |
| 15 (14). | Average size larger. Outer apical angle of elytra completely rounded off. Mesosternum and apex of abdomen black. Dorsal aspect of median lobe of cœdeagus elongate-triangular, somewhat attenuate in its apical half, apex sub-acute ... | 8. <i>bicolor</i> , Payk. |
| 16 (7). | Reflexed margins of thorax and elytra nigro-æneous. | |

- 17 (18). Punctures of the inner striæ not, or scarcely finer than those of the outer. Dorsal aspect of median lobe of cedeagus elongate-triangular, apex acute ... 9. *marinus*, Gyll.
- 18 (17). Punctures of the inner striæ distinctly finer than those of the outer. Dorsal aspect of median lobe of cedeagus elongate-triangular, suddenly narrowed about half-way from the base, and thence parallel-sided to its subtruncate apex ... 10. *opacus*, Sahl.

For the examination of the sculpture of the interstices in these insects an amplification of about 40 diameters is very convenient.

Both *G. elongatus* and *G. bicolor* are subject to considerable variation in shape, some specimens being very narrow and convex. In the English descriptions of the latter insect too great a point is made of its more elongate and parallel form, as a means of distinguishing the species from *elongatus*,—probably because most, if not all, of the authentic British specimens pertain to the var. *angustatus*; but Dr. Sharp has kindly given me some Swedish examples of veritable *bicolor*, not one of which actually belongs to that variety, and which, so far as size and form are concerned, I can exactly match with a few abnormally large females out of an extensive gathering of *elongatus*. Here, however, the form of the elytral apices, and the colour of the mesosternum and apex of the abdomen, serve to separate the two species. I mention this to show that a *Gyrinus* may be the true *bicolor* without being exceptionally elongate, parallel-sided, and convex.

Several of our species have a dull form, resembling in that respect the normal form of *minutus*; I have it, in both sexes, in *suffriani*, *natator*, *marinus* (in which species it is very frequent), and *opacus*.

131, Rupert Street, Norwich, March 15, 1890.

NEW SPECIES OF LEPIDOPTERA FROM CHINA.

By J. H. LEECH, B.A., F.Z.S., &c.

(Concluded from p. 83.)

CAMPYLOTES PRATTI, sp. n.

Agrees in design with *Campylotes* (*Epyrgis*) *desgodinsi*, Oberthür (Etud. d'Ent. 9, pl. xi. fig. 10), but differs therefrom in its larger size and in having a black transverse basal band on primaries; the inner portion of the basal half of all the wings is decidedly yellow instead of salmon-pink, as in *desgodinsi*. Further, the pectinations of the antennæ are much longer. Expanse, ♂ 70 mm., ♀ 82 mm.

I received a number of specimens from Chang Yang. From their fine condition these appeared to have been bred.

EUSEMIA VITHOROIDES, sp. n.

♂. Ground colour black; primaries with two creamy white blotches in the cell, one near the base, the other towards the extremity; a central series of five spots of the same colour, the first, third and fourth longitudinal and larger than the rest; there is also a whitish streak at the base of wing; on the costa near the base are three bluish transverse bars, and parallel with outer margin three indistinct rows of bluish spots; a row of longitudinal marks along inner margin. Secondaries with a broad creamy white basal band, and central band of spots of the same colour; between these bands is situated a large creamy white blotch. Fringes white, chequered with black. Abdomen black, with a white ring at its base, and an orange one on last segment; anal tuft also orange. Under surface much as above, but more tinged with blue; a very distinct submarginal band of whitish spots on primaries, and a whitish basal streak on costa of all the wings; pectus and abdomen rich orange; legs black. ♂ Expanse, 73 mm.

One male taken at Chang Yang in June.

This insect bears a wonderful superficial resemblance to *Vithora stratonice*, Cram., of which species it is probably a mimic.

SEUDYRA SUBALBA, sp. n.

♂. Closely allied to *S. longipennis*, Walk., but the ground colour of primaries is white, thickly sprinkled on basal half with dark grey, the inner margin is not shaded with bluish grey, but there is a patch of this colour between the central lines; the laky brown apical patch encloses a small bluish cloud which has a paler, almost white, spot on its exterior edge; the patch of brown beyond outer line is larger and more crimson in tone. Secondaries yellow, broadly bordered with black. Under surface of primaries white; costa narrowly and outer margin broadly bordered with black, the latter tinged with white at apex; there is a patch of the same colour along inner margin from base to beyond middle, and the discal spots are also black; secondaries as above. Expanse, 44—47 mm.

Five male specimens from Chang Yang, where they were taken in June, and one example of the same sex from Ichang, also taken in June.

SEUDYRA MANDARINA, sp. n.

♂. The costal and central portion of primaries greyish, sprinkled with darker scales; discoidal spots blackish, ringed with pale grey; inner and outer marginal areas purplish, clouded with purplish brown. Secondaries deep orange, with a large, round, black central spot; a submarginal band of black confluent spots, connected from the anal angle with the base of the wing by a blackish suffused streak. Under surface deep orange, clouded with reddish brown about the margins; discal and central spots on primaries, and discal and anal spots on secondaries, black. Expanse, 50 mm.

A fine male taken at Chang Yang in July.

SEUDYRA FLAVIDA, sp. n.

♂. Primaries grey, sprinkled with brownish scales; apical portion and outer margin clouded with purplish brown; along the inner margin is a large patch of purplish brown, maroon at the base and towards inner angle, this is traversed by two black bars intersected by a yellowish line; discal spots purplish brown, ringed with white; secondaries orange-yellow, *without any black markings*. Under surface dull golden orange, clouded with reddish brown about the outer margins; discal spots and patch along inner

margin of primaries blackish brown; there is also a blackish discal spot on secondaries. Expanse, 66 mm.

Three males taken at Chang Yang in August.

CHELONIA BIETI, Oberth.

Var. *pratti*.

This form is larger than the type; the transverse band on primaries from costa to inner angle is much broader and more irregularly outlined; the black markings on secondaries are more pronounced, and in addition there are two round black spots towards the base of the wing. The segmental divisions of the body are bright scarlet, of which colour there is also a broad band along each side. The under surface agrees with the upper, which is not the case in the type. Expanse, 74 mm.

Three females of this form taken at Chang Yang in June.

DIONYCHOPUS RUBIDUS, sp. n.

♀. Ground colour white, rather silky; secondaries with a submarginal row of four black spots, one situated towards outer angle, the other three near anal angle, the last two of which are only separated by the submedian nervure; there is also a small black bar-shaped mark situated at the end of the cell. Under surface as above, with the addition of a small black spot at base of secondaries. Abdomen brilliant crimson above, white beneath, with dorsal and lateral series of black quadrate spots; tip of anal segment white. Femora and tibiae of anterior legs crimson; there is also a crimson mark below each eye; antennae black, white at the base and apex. Expanse: ♂ 74 mm.; ♀ 69 mm.

Two specimens taken at Chang Yang in July and August.

Allied to *Dionochopus niveus*, but differs especially in the crimson body, black spots of secondaries, and colour of antennae.

CRINOLA FLAVICOLLIS, sp. n.

Semitransparent whitish; neurulation, costa, outer margin, and fringes of all the wings fuliginous-grey. Head and thorax fuliginous-grey; collar yellow. Abdomen whitish, ringed with fuliginous-grey towards base. Expanse, 40 mm.

Four specimens taken in May and June at Chang Yang.

GYNÆPHORA PLUTO, sp. n.

♂. All the wings sooty black; primaries slightly paler at the end of the cell; under surface the same, but rather paler; legs, pectus and abdomen dirty yellowish white; head and palpi bright orange. Expanse, 36 mm.

Two male specimens taken near Ichang, one in July, the other in August.

ARTAXA MONTIS, sp. n.

♂. Primaries pale yellow; a thin sprinkling of black scales forms a band from the centre of the wing to the inner margin. Secondaries white, with a yellow tinge, rather silky. Head and thorax orange; abdomen black, except the first and anal segments, which are orange. Under surface silky white; abdomen and legs yellowish. Expanse, 40 mm.

A single male taken at Chang Yang in June.

ORGYIA PRISCA, sp. n.

♂. Primaries chestnut-brown, traversed by two darker transverse lines, the inner line almost straight, the outer first curves towards the apex, then

descends obliquely to inner margin; discal area of wing towards the costa suffused with darker; there are a few white scales about the centre of the costa and a small white apical dash. Secondaries chocolate-brown. Under surface light brown, suffused with darker. Expanse, 30 mm.

I received a nice series of males taken at Chang Yang in June and July.

NUMENES DISPARILIS, Staud., Rom. Mém. Lep. iii. p. 200, pl. xi. fig. 2, a, b (1887).

Var. separata.

♂. This form differs from the type on primaries in having a band connecting the yellowish white fascia with the apex, also a white spot near the base of the costa; on the secondaries the typical white central patch is absent.

The female differs in the wide basal band of primaries, and in having two black spots instead of a streak on secondaries.

Both sexes exceed typical measurements, the difference being ♂ 58 mm., ♀ 82 mm., as against ♂ 50 mm., ♀ 58 mm.

Two males and a female taken at Chang Yang in July.

JANA MANDARINA, sp. n.

Primaries: inner two-thirds chocolate-brown, very woolly about the base; central line straight, dark chocolate; outer line dark chocolate, straight, bordered internally with whitish brown; submarginal line blackish brown, wavy, dividing the outer third of wing into two nearly equal parts, the outer of which is light brown, the inner suffused with darker. Secondaries pale brown, suffused with blackish scales about the disc; two straight central lines and a wavy submarginal line dark brown. Thorax chocolate-brown; abdomen ferruginous; antennæ black. Under surface ferruginous-brown, with the markings of upper surface rather darker. Expanse, 79 mm.

One female taken at Chang Yang in July.

ANTHERÆA THESPIA, sp. n.

Ground colour pale olive-brown; primaries sprinkled about the discal area with brownish orange scales; a large pale green subhyaline spot nearly circular, margined with black, and intersected by a white line, is situated about the centre of the wing towards costa; beyond this spot the wing is traversed by a row of subhyaline spots partially obscured by scales, and connected by a dark wavy line, externally bordered with orange; beyond this is a broad wavy band of chocolate-brown; there is also a wavy, indistinct, chocolate submarginal line, and the apical patch is ashy grey. Secondaries with a distinct ocellus; the centre is a large pale green subhyaline pear-shaped spot, bordered with black, the edge of this last is intersected by a white line, and the whole is surrounded by bright yellow which merges into the ground colour, and is bordered by black on its upper and outer portions; bands as on primaries, but the subhyaline spots more open; thorax and base of all the wings thickly clothed with woolly scales. Abdomen russet-brown. Under side much as above, but suffused with violet-grey. Expanse, 162 mm.

One female taken at Ship-y-Shan, near Ichang, in September.

DREPANA PARVULA, sp. n.

Ground colour of primaries mouse-grey; at the end of the cell are two white dots, from the first of which a dark line curves to the inner margin; two other dark lines start from the apex, one descending with a slight curve to the outer angle, the other to the centre of inner margin; at the apex is a

small yellowish spot, bordered externally with black. Secondaries brownish grey; head and thorax mouse-grey; abdomen brownish grey. Under surface silky white, upper portion of primaries shaded with grey. Expanse, 24 mm.

One example from Chang Yang, July. Four specimens, including both sexes, taken by myself at Ningpo in April, 1886.

DREPANA ACUMINATA, sp. n.

♂. Pale reddish brown; apex of primaries blackish, much produced and acutely pointed; two dark brown lines traverse the disc of the wing, the first is deflected to median nervure, then inflected to inner margin, the second runs from costa towards outer margin as far as first discoidal nervure, where it joins a darker apical streak, then turns inwards and descends obliquely to inner margin; an obscure submarginal line; two small black central spots. Secondaries have two central dark brown lines, the first curved and the second straight; submarginal line slightly wavy, also dark brown. Under surface whitish, tinged with brown over costal area of primaries, one central black spot; a dark brown line traverses the wing from near blackish apex to inner margin; submarginal line obscure; secondaries have a central black spot and dark brown transverse line; submarginal line also dark brown, but very faint. Expanse, 39 mm.

One male specimen taken in July at Ichang.

Allied to *D. falcataria*.

DREPANA BIDENS, sp. n.

Primaries: outer margin deeply concave below the apex and less deeply before inner margin; purplish black, outer margin bordered with tawny, interrupted by a line and cloud of the ground colour and preceded by a broad whitish band. Secondaries similar to primaries, but rather paler and without whitish submarginal band. Under surface pale ochreous-brown; discal area suffused with dark grey. Expanse, 30 mm.

One example taken in July at Chang Yang.

DREPANA FLAVILINEA, sp. n.

♀. Smoky grey, tinged with violet; basal line of primaries yellowish, but not clearly defined, central line yellow, starting from the yellowish apex; submarginal line is also yellowish, narrow, united with central line towards apex; all these lines are continued across the secondaries: the apex of primaries is produced and obtusely pointed; there is a minute white central spot. Under surface pale ochreous-brown. Discal areas of all the wings suffused with greyish, and traversed by a faint line; a small white central dot on primaries. Expanse, 32 mm.

Two female specimens taken in July at Chang Yang.

THYATIRA TRIMACULATA, Brem.

Var. *chinensis*.

Primaries chocolate-brown; there are three nearly round white patches with brown centres, one at the base,—this is the largest, and has the brown centre sprinkled with black scales,—one at the apex, and one at the outer angle; there is a series of pale marginal lunules. Secondaries fuscous-brown, paler towards the base, with a dark central spot and line. Under surface fuscous-grey, paler towards the inner margins.

Female like the male, but larger. Expanse: ♂ 38 mm.; ♀ 41 mm.

Differs from the type in size, darker colouring, and different shape of the spot at outer angle of primaries.

A nice series from Chang Yang, June and July. Ichang, August.

Var. albomaculata.

Arrangement of markings as in "*var. chinensis*," but spots almost white; secondaries much paler, and with central spot and line very distinct. Expanse, 48 mm.

One female taken near Ichang in August.

DESCRIPTIONS OF NEW SPECIES OF PHYTOPHAGOUS COLEOPTERA RECEIVED BY MR. J. H. LEECH, FROM CHANG-YANG, CHINA.

BY MARTIN JACOBY, F.E.S.

(Continued from p. 89.)

DIORYCTUS VARIABILIS, n. sp.

Black; the head, antennæ, thorax and the legs fulvous; elytra black, extremely finely punctate-striate.

Var. Head and thorax nearly black. Length 1—1½ line.

Head with a few extremely fine punctures, visible only under a strong lens; eyes slightly but broadly emarginate, the emargination rounded; antennæ entirely fulvous, short, the terminal joints lightly and gradually thickened; thorax of the same shape as in the preceding species, and similarly coloured, entirely impunctate; scutellum invisible; elytra with the basal lobe scarcely produced, black, the punctured striæ scarcely perceptible; legs fulvous; prosternum much broader than long, its surface flat without anterior projection.

This small species is similarly coloured as the preceding, but differs totally from it in the nearly impunctate head and elytra, their shape, and the structure of the prosternum; the variety does not seem to differ, except in its almost entirely black colour.

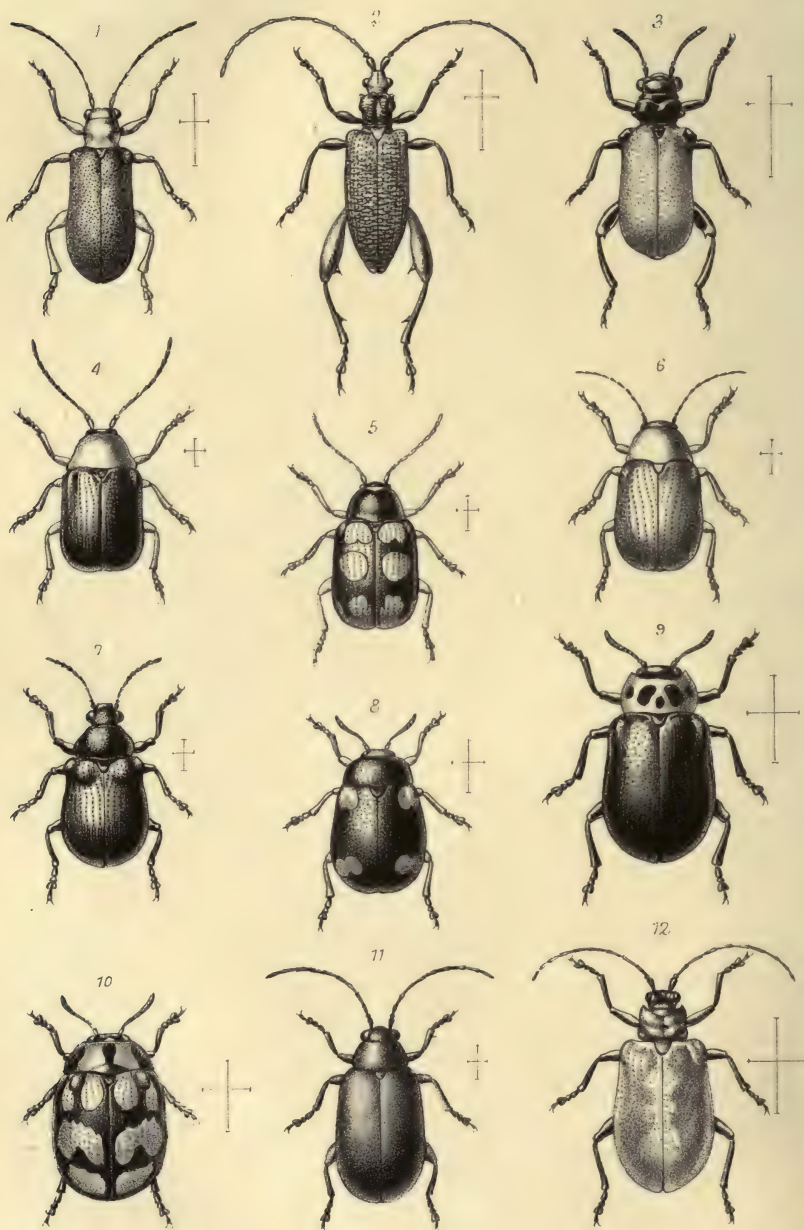
AORIA CHINENSIS, n. sp.

Fulvous, pubescent; the antennæ (the basal joints excepted), the apex of the femora and the tibiæ, black; thorax coarsely punctured; elytra depressed below the base, punctate-striate, the interstices more or less costate.

♀. Elytra more strongly costate.

Var. Head or thorax black; legs entirely fulvous. Length, 2½—3 lines.

A. chinensis, although closely allied to *A. nigripes*, Baly, and *A. bowringii*, is quite distinct; the head, which is either fulvous or black, is closely punctured; the antennæ are black with the exception of the lower four joints, which are fulvous, they extend nearly to the end of the body; the thorax is less globose than in the allied species, more transverse in shape and has an obsolete transverse depression at each side, the surface is coarsely punctured and clothed with fulvous pubescence; the elytra are



W. Purkiss del. et lith.

West, Newman imp

New species of Coleoptera from China



W. Purkiss del. et lig.

West, Newman imp

New species of Coleoptera from China.

similarly pubescent, and have a distinct oblique depression at the base, which is absent in *A. nigripes* and *A. bowringii*; the punctures are transverse in shape and frequently arranged in double rows, the interstices are slightly convex, in most specimens the legs are black, with the base of the femora fulvous; in others the head, antennæ and legs are entirely black.

Several specimens.

TALMONUS, *Fairm.*

This genus, recently described by M. Fairmaire, seems to me to be identical with *Lypesthes*, Baly, and his species, *T. farinosus*, with *L. ater*, Motsch. (*pulverulentus*, Jac.). This is, therefore, the third time that Motschulsky's species has been described under different names.

Many specimens.

NODOSTOMA ORIENTALE, n. sp. (Pl. I. fig. 7).

Greenish-æneous, the base of the antennæ and of the femora, fulvous; head and thorax closely and finely punctured, the sides of the latter subangulate: elytra strongly punctate-striate, the base connex; femora with a minute tooth.

♂. Elytra less regularly and subgeminately punctate-striate.

♀. Elytra very regularly punctured, with a short oblique costa below the shoulders. Length, 2 lines.

♂. Of dark greenish-æneous colour, the head rather closely and strongly punctured and subrugose, the epistome not separated from the face; labrum fulvous; antennæ about half the length of the body, the lower four joints fulvous, the first stained with black above; thorax about twice as broad as long, the sides distinctly angulate at the middle, the surface rather closely but somewhat less strongly punctured than the head; elytra with the base distinctly swollen and depressed below the raised portion, the base rather irregularly punctured, the striae more regular posteriorly but here and there appearing double, the shoulders prominent, forming a slight ridge; the femora with a very minute tooth.

N. orientale seems closely allied to *N. puncticollis* Weise, also from China, but differs in the punctured clypeus, the angulate sides of the thorax and the swollen base of the elytra; the latter is much more distinctly visible in the female, which may be mistaken for another species, since the elytral punctuation is very strong and regular throughout, a short but strong oblique costa extends from the shoulder to the lateral margin, all other characters agree with that of the male; both sexes were obtained in sufficient numbers.

NODOSTOMA GIBBOSUM, n. sp.

Oblong-ovate, widened behind, dark æneous; the labrum, base of the antennæ and base of the femora and tibiae fulvous; thorax closely and strongly punctured; elytra convex, strongly widened, finely punctate-striate. Length, $1\frac{1}{2}$ line.

Head closely and strongly punctured, the vertex subrugose, the epistome also strongly punctured, separated from the face by an obsolete transverse depression, its anterior edge deeply concave-emarginate; labrum and palpi fulvous; antennæ black, the lower three joints fulvous, the first stained with

piceous above; thorax about one half broader than long, the sides rounded and widened, very obsoletely angulate below the middle, the anterior angles slightly pointed, the surface very strongly and rather closely punctured, a narrow longitudinal central space as well as the extreme anterior margin, smooth; elytra convex, strongly rounded towards the middle and pointed at the apex, the punctures rather finely impressed but distinct to the apex, the base with a shallow transverse depression, only visible in certain lights, the interstices above this depression subtuberculate (male), or subcostate (female), the sides in the female also furnished with a short costa below the shoulder and a longer one further inwards; the four posterior femora minutely toothed.

This species, which has all the characters peculiar to the genus, is much distinguished by its shape and the sculpture of the elytra; the thorax also is longer than is usually the case, and its sides are scarcely angulate.

A few examples.

CLEORINA LEFEVREI, n. sp.

Metallic dark blue or violaceous; antennæ black, the basal two or three joints fulvous; finely and moderately closely punctured; elytra with a transverse depression below the base, finely punctate-striate. Length, $1\frac{1}{4}$ — $1\frac{3}{4}$ line.

Of broadly ovate shape, the head rather closely and distinctly punctured, the epistome not separated from the face, the anterior edge of the clypeus deeply concave-emarginate; antennæ less than half the length of the body, black, the third and fourth joints of equal length, the lower three fulvous, the basal joint stained with metallic-blue above; thorax transverse, twice as broad as long, the sides nearly straight, the surface punctured like the head, the punctures subremotely placed; scutellum impunctate, broad, its apex acute; elytra with a deep transverse depression below the base, the shoulders prominent, the punctured striæ fine (except within the depression), nearly indistinct at the apex.

Closely allied to *C. janthina*, Lefèv., but quite distinct. Numerous specimens were obtained.

CHRYSOMELA SERIEPUNCTATA, ? Weise.

The description of this *Chrysomela* from Siberia, by the author in Wiegmann's 'Archiv,' 1887, agrees so closely with the specimens from Chang Yang, that I must refer them to that species, the more so as the very numerous and variable species already described, from the East, are for the greater part very difficult to separate. The present insect is entirely metallic dark blue, the thorax is very finely and rather closely punctured on the disc (Weise says not closely), and the sides have a deep row of coarse punctures (deepest near the base), which limit the nearly smooth lateral and slightly raised marginal space; the elytra have numerous rows of strong punctures, which only at the sides can be distinguished as being arranged in pairs, the interstices are nearly as strongly, sometimes more finely, punctured. All this agrees with the author's description.

CHRYSOMELA SIBIRICA, Weise.

Numerous specimens, agreeing entirely with the author's description, were obtained by Mr. Pratt; the upper surface of the

insect is of a violaceous-cupreous colour; the thorax is very finely punctured on the disc, coarsely at the sides, which latter have a deep longitudinal depression at the base; the elytra have four double rows of deep punctures, with numerous finer ones on the interstices.

PHYTODECTA FLAVO-PLAGIATA, n. sp. (Pl. I. fig. 8).

Black; the head, apical joints of the antennæ, and the legs partly, fulvous; thorax finely punctured; elytra more strongly and semi-regularly punctate, black, a transverse spot on the shoulder and another near the apex, flavous. Length, $2\frac{3}{4}$ —3 lines.

Of subquadrate and moderately convex shape, the head fulvous, finely and rather closely punctured; antennæ not extending beyond the thorax, the lower five joints fulvous, the others black, very broadly dilated; thorax about three times broader than long, the sides rather strongly rounded, the surface finely and rather closely punctured on the disc, the punctures of various size, those at the sides much larger, the lateral margins slightly thickened, smooth and fulvous, the rest of the disc black; scutellum very broad, impunctate; elytra not broader at the base than the thorax, more strongly punctured than the latter, the punctures partly arranged in rows, the shoulders with a transversely-shaped flavous spot, and another one of similar shape placed at the sides and at some distance from the apex; the under side and legs nearly black, the femora and tibiæ more or less fulvous. Easily known from its congeners by the coloration of the elytra; the subapical spot of the latter is generally more or less constricted at its middle.

Four specimens.

MELASOMA MACULICOLLIS, n. sp. (Pl. I., fig. 9.)

Metallic violaceous blue; thorax flavous, finely punctured with five spots, placed transversely; elytra semi-regularly punctured, longitudinally impressed below the shoulder; sides of abdomen fulvous, spotted with black. Length, 5—6 lines.

Head finely punctured at the sides; antennæ not extending beyond the thorax, the terminal joints gradually thickened, black, the basal four joints more or less fulvous below; thorax narrowly transverse, the anterior margin concave at the middle, the sides strongly rounded anteriorly, the surface very finely punctured, flavous, with five black spots, a small one at each side, another at the middle of the base, and two large spots at the middle of the disc; scutellum black; elytra broader than the thorax, metallic dark blue, rather closely and finely punctured, the punctures arranged partly in single or double rows; a short distinctly raised costa is seen in front of the shoulder near the base (female), which in the male insect is replaced by a longitudinal smooth space; the shoulders are prominent and swollen; the underside and legs are metallic blackish blue, but the sides of the abdomen are bright flavous, each segment having a black spot at the sides, the last segment with two central spots.

Of this large and handsome species several specimens were obtained; the elytral short costa in the female is very peculiar, and is followed at the sides below the shoulder by a short longitudinal groove, visible in both sexes.

PHYLLODECTA MULTIPUNCTATA, n. sp.

Metallic dark blue; the head and thorax closely punctured, elytra deeply punctate-striate, the striæ rather irregular, the interstices finely

punctured and somewhat rugose; margins of the abdominal segments fulvous; tarsi piceous. Length, $1\frac{1}{2}$ line.

Head distinctly and closely punctured; antennæ black, the basal two joints fulvous below, the third joint longer than the fourth and second joint, the terminal ones strongly thickened; thorax transverse, twice as broad as long, the sides nearly straight, the surface finely but rather closely punctured with an obscure central smooth narrow ridge; scutellum black, impunctate; elytra with deeply punctured striæ, which are occasionally doubled and distinct to the apex, the interstices very slightly raised, finely punctured, and at the sides slightly rugose; under side of a more dark greenish-æneous colour, with the extreme margins of the abdominal segments fulvous; tarsi piceous.

This species, although closely allied to several others, described by Motschulsky, seems to differ in the close punctuation of the thorax, the sculpture of the elytra, and the colour of the under side.

PAROPSIDES MACULICOLLIS, n. sp. (Pl. I., fig. 10.)

Fulvous; head black in front; thorax very closely punctured, the base, lateral margins, and a central stripe, black; scutellum black; elytra semi-regularly punctured, the lateral and sutural margins, a transverse band near the middle, another below the latter, and a longitudinal stripe at the shoulder, black. Length, $3\frac{1}{2}$ —4 lines.

Head very finely and closely punctured, black, the base with a fulvous spot; antennæ fulvous, not extending beyond the thorax; thorax three times broader than long, very finely and closely punctured, the sides with a small fovea, the disc fulvous, the sides broadly, and a narrow central longitudinal stripe black, the base with another black, medially widened transverse band; elytra with numerous rows of strong punctures, the interstices nearly as strongly punctured, the disc fulvous, the sutural and lateral margins narrowly black, a similarly coloured transverse band is placed near the middle, extending across the suture, where it is greatly widened; this band is joined by a longitudinal black stripe, extending from the shoulder downwards; another transverse narrow band, triangularly widened at its middle, extends across the disc below the middle; prosternum raised and truncate in front; breast and legs sometimes fulvous.

This species closely resembles *P. 12-maculata*, Gebl., but is, I think, quite distinct, since the differences are constant in more than the fifty specimens which are contained in this collection; the colour of the thorax is different from that of the allied species, the pattern of the elytra partly resembles it, but the third transverse apical stripe in *P. 12-maculata* is absent in the present insect, the punctuation of the elytra is distinctly stronger, and the larger punctures are more regularly placed in rows.

PAROPSIDES (PHYTODECTA) NIGRO-SPARSUS, Fairm.

The description given by M. Fairmaire of this species surely proves that it cannot belong to the genus *Paropsides*; the triangularly dilated tibiæ and shape of the prosternum doubtless belong to *Phytodecta*, and Fairmaire's species seems to be identical with *Phytodecta 13-maculata*, Jac., described in the Proc. Zool. Soc., 1888, also from China; the only difference I can see is the absence of the lateral spots of the thorax in Fairmaire's species, and its somewhat larger size.

(To be continued.)

TWO SPECIES OF MICRO-LEPIDOPTERA NEW TO THE
BRITISH LIST.

By J. B. HODGKINSON.

RETINIA MARGAROTANA, H.-S.

WHEN looking over my collection Messrs. Barrett and Webb detected the above handsome species among *Retinia pinivorana*. A few days afterwards I found a second example among my duplicate *R. pinivorana*. This specimen I took off Scotch fir on the moors above Stoneyhurst, in June, 1879; it is in fine condition, as also is the other, which I have no doubt was sent to me with *R. pinivorana* from the west of Scotland. 1879 produced several other novelties, such as *Coccyx scopariana*, *Penthina postremana*, *Nemophora pilella*, and *Trifurcula pallidella*.

BRYOTROPHA (GELECHIA) OBSCURELLA, Hein.

On July 5th, 1887, I took two fine specimens of this species in the vicinity of Windermere College. Mr. Stainton, to whom the specimens were submitted on two occasions, was unable to identify them. When Messrs. Barrett and Webb were here I showed them the species, but neither of these gentlemen could name it then. Subsequently I forwarded the specimens to Mr. Barrett, and suggested that, if they were not referable to any known species, he or I had better describe and name them: this latter course, however, was found to be unnecessary, as Mr. Barrett has determined them to be *Bryotropha obscurella* of Heinemann.

Ashton-on-Ribble, Feb. 16, 1890.

NOTES ON SILK-PRODUCING AND OTHER BOMBYCES.

By ALFRED WAILLY.

DURING the last few years, having been absent from home from the beginning of August till the middle of September, my rearings of Silk-producing Bombyces and other Lepidoptera had to be discontinued at the end of July. But notes were taken, as usual every season, up to that time. Of Asiatic and North American species reared and mentioned in previous reports, nothing of importance can be stated. But after many years' experience I can now state that the following species, if protected from their enemies, can be reared in the open air even in England:—*Antheræa pernyi* (the North-China oak silkworm), *A. yama-mai* (the Japanese oak silkworm), *A. roylei* (the Himalayan oak silkworm), *Telea polyphemus* (polyphagous North

American silkworm), and *Attacus cynthia* (the *Ailanthus* silkworm). *Platysamia cecropia* (North American) might also be added : this species seldom succeeds in England in the open air, as it remains too long in the larval state before spinning, but in Central and South Europe it would thrive splendidly. It feeds on fruit trees and most forest trees. The larvæ of the first four species produce fine and excellent silk and form "closed" cocoons, the last two "open" cocoons. As I have mentioned *P. cecropia* I may, I think, be allowed to make a little digression.

Mr. T. D. A. Cockerell has published (Entom. xxii.) several interesting articles on the "Variation of Insects," and (page 177 of that volume) he invites those who possess dwarfed Lepidoptera to examine them and report on the sex. The paragraph referred to runs thus :—

"Lepidoptera may be dwarfed in captivity, by giving the larvæ an insufficient supply of food, and it has been stated that these dwarfs are generally of the male sex. Mr. T. G. Gentry (Can. Ent. 1877, 50) believed he could influence the sex of insects in this way, and out of twenty *Samia cecropia* so reared eighteen proved to be males. It would be interesting if all those who possess dwarfed Lepidoptera would examine them and report on the sex."

Now I quite agree with the first statement, that an insufficient supply of food will produce dwarfed individuals ; but with respect to the second statement, that the dwarfs will generally be of the male sex, this I consider erroneous and only accidental. I never was more surprised than when I read that the sex of insects could be influenced in any way. It comes to this—that an insect which, with a sufficient supply of food, would have been a female, will turn into a male if kept short of food. In no other sense can I understand the statement. I have had considerable experience with the breeding of *cecropia* moths from cocoons received from North America. This year I received 1500 cocoons,—nothing compared with the number sent to me in 1878, which was 5500. For years I have had this species of *Samia*, and I never noticed that the number of male dwarfed specimens exceeded in any permanent degree the number of female specimens. Sometimes the males will predominate, and sometimes the females. This year a small number of *cecropia* larvæ were bred here in captivity, in Norbiton, by one of my neighbours, who brought me the thirteen cocoons obtained. All were very small, but male and female moths (about half the natural size, and even less) emerged from the cocoons, only one pupa having died. Of the American cocoons, not bred in captivity, but all collected in the country, a number of dwarfs were found, as is often the case ; and male and female moths emerged from these tiny cocoons in about equal numbers. From a hundred *Callosamia promethea*

cocoons, all extremely small, again male and female moths emerged, about half the size of ordinary specimens. I do not know whether the larvæ of these *promethea* were bred in captivity, but I should think so considering their small size.

In nature, however, there are dwarfed individuals in all species of insects and other animals, and this has nothing to do with the quality or quantity of food consumed, as they live side by side with, and on the same food as, their brother giants. It is a freak of Nature, who delights in creating these dwarfs and giants, with all the intermediate sizes between.

With respect to small-sized insects, I may also say that I have frequently found small moths possessing more activity and vitality than larger ones, just as we find some small men stronger than big men.

Taking my leave of the dwarfs and the giants, I will say a word or two about young larvæ. My belief is that a larva, if it lives, must produce in course of time a male or a female perfect insect, *independently* of the quantity or quality of food it may have consumed. There are two different kinds of larvæ in each species. With some, size alone seems to be the only difference, but in others there is a marked difference; for instance, in *Actias luna* from N. America, the smaller larvæ in the first stage have longitudinal lines all along the sides of the body; the larger larvæ, on the contrary, are all pale green, without any markings at all. In all probability the larger larvæ produce the female moths, the smaller ones the males.

After this digression, of which I had not seen the length at the outset, I will pass to the remarks I have to make on the silk-producing Bombyces I received during the last few years.

From Assam every year, in winter and spring, I had large quantities of *Antheræa assamensis* sent to me, but never could obtain a single moth. This year over 400 were sent, all the moths having emerged on the voyage or died in the chrysalis. Some of the moths appeared to have emerged only a few days before their arrival, and this shows that there would be a possibility to receive the cocoons before the emergence of the moths, if they were sent in small boxes by *sample* post, going overland like the letters, instead of sending them in large boxes by *parcel* post, which takes a fortnight or more longer.

Another species, sent also from Assam, was *Attacus ricini*, the cultivated *A. cynthia*. This species is still worse to travel, the moths emerging in about a fortnight or three weeks; therefore the cocoons were tied to strings laid across the boxes, to give room to the moths to emerge, pair, and lay their eggs, but I found the young larvæ hatched and dried up.

To obviate this rapid emergence of the moths, my correspondent in Assam placed in some of the cases *A. assamensis* larvæ, which were just beginning to spin, thinking by so doing

that about a week would be saved. The experiment was a complete failure, but it has taught this lesson—that larvæ cannot live, or change into pupæ that will live, when they are travelling; the shocks experienced by the larvæ when travelling prevent them, first of all, from forming their cocoons properly, then the shakings kill the larvæ or newly formed pupæ; therefore I only found dead larvæ or dead pupæ in the cocoons.

In 1886 I received live cocoons of *Dirphia tarquinia* from French Guiana. This species is remarkable for the beauty of the perfect insect, but the cocoon—fusiform, or spindle-shaped, thin, and rather similar to, but larger than, that of *Lasiocampa potatoria*—is useless as a silk-producer. From eighteen cocoons sixteen moths emerged between the 14th of July and the 17th of August. A pairing took place on the 4th of August, the female laying until the 8th of August 207 eggs. Only a few larvæ hatched, and they all died within a few days. I have here to remark that if pupæ from hot countries are considerably delayed in producing their moths in consequence of a great change of climate, the moths, although the pairings take place, and although they seem perfectly healthy, lay eggs that are not fertile, as a rule. Being months instead of weeks before they emerge, the moths of these tropical regions seem to have lost their vitality and power of reproduction. Besides, a considerable number of these tropical species die in the pupa state, when the heat is not sufficient to allow the moths to emerge just at the time they are ready to make their appearance.

Tudor Villa, Norbiton, Surrey.

NOTES ON DIPTERA, IN 1889.

By E. BRUNETTI.

THE time I was able to devote to collecting last year was again exceedingly limited, and most of the following notes refer to specimens sent me by correspondents for identification. It will be seen that I am able to introduce a few new species,* and as these have been captured by collectors who have only recently taken up the study of this order, I trust it will be sufficient encouragement to others to turn their attention to the Diptera, where even beginners can render so much assistance.

The new species referred to are the following:—

Psilocephala ardea, F. Birmingham; taken by R. C. Bradley.

Lasiops semicinerea, Wied. Birmingham; taken by R. C. Bradley.

* By a new species I mean a species not given in Mr. Verrall's recent list, which may be taken as a basis for all future catalogues.

Leria ruficauda, Zett. Reading; taken by E. Brunetti.

Heteromyza atricornis, Mg. Aberdeen; taken by E. Terras.

Sapromyza platycephala, Loew. London; taken by E. Brunetti.

Cecidomyidæ.

Cecidomyia destructor, Say. One specimen sent me from Alford (Lincolnshire) by Mr. Mason; bred by him from puparia collected in that locality during the autumn of 1888. Owing to mould, I believe only one specimen emerged, but this is, to the best of my belief, *C. destructor*, the "Hessian Fly."

Mycetophilidæ.

This is a group I have not worked at, so I have been unable to identify the few examples that have passed through my hands.

Bibionidæ.

About eight common species have been sent me, none calling for any special remark.

Psychodidæ.

Psychoda sexpunctata, Curt. From London in June and July; also the common *P. phalenoides*.

Tipulidæ.

Dicranomyia dumetorum, Mg. London, early in May; abundant for two or three days, since which time occasional specimens have appeared. I have two other species of this genus, one from London, the other from Staines.

Erioptera flavescens, Mg. Hastings, Aug. 28th.

Stratiomyidæ.

Chrysonotus bipunctatus, Scop. One specimen of this rather rare species was taken by Mr. Tumaley near Birmingham.

Beris morrisii, Dale. Dover.

Xylophagidæ.

Xylophagus ater, F. One specimen of this rare species was sent me by Major Yedbury, taken at Plymbridge, May 16th.

Tabanidæ.

Several common Tabanidæ and Leptidæ have been sent me.

Asilidæ.

Isopogon brevirostris. Ivybridge, June 16th; Cornwood, June 2nd.

Bombilidæ.

Bombylius major, L. Maidstone, June 2nd; Westerham, April 23rd.

B. discolor, Mik. Dover; Maidstone. May and June.

Therevidæ.

Psilocephala ardea, F. One specimen of this species was taken by Mr. Bradley at Wyre Forest, near Birmingham, on July 7th. This species is new to the British lists.

Thereva plebeia, L. (*lugens*). Dover.

T. fulva, Mg. Dover.

Scenopinidæ.

Scenopinus fenestralis, L. One from Birmingham. Last year I took several in London, but this year not one has appeared, though its natural habitat seems to be houses.

Empidæ.

Empis lucida, Zett. Aberdeen. Not a common species, though it seems to have been common there.

Hilara maura, F. This species swarmed over a sheltered stream at Staines on May 23rd last. I took over 1200 specimens in a quarter of an hour, two or three strokes of the net being sufficient to obtain a solid mass of flies at the bottom of it.

Tachydromia candicans, Fall. Dover.

Dolichopodidæ.

This group I have not studied, but I have recognised

Dolichopus brevipennis, Mg., from Birmingham.

Pæcilobothrus nobilitatus, L. Wimbledon, July 12th; not uncommon over one clump of bushes.

Argyra diaphana, F. Birmingham.

Lonchopteridæ.

Lonchoptera lutea, Pg. Wimbledon, July 12th.

L. flavicauda, Mg. Staines, May 23rd.

? *L. trilineata*, Zett. I took several specimens at Wimbledon on July 12th of what appears to be this species. Mr. Verrall does not give it in his list as British, so I should not like to answer for its correct identification.

Syrphidæ.

Pyrophæna rosarum, F. Birmingham.

Xanthogramma citrofasciatum, DeG. Maidstone.

Ascia podagrica, F. Dover. A specimen from Staines appears to be *A. dispar*.

Volucella inanis, L. Three from Birmingham.

Sericomyia borealis, Fall. Birmingham.

S. lappona, L. Ivybridge, May, June.

Eristalis horticola, DeG. Plymouth, May 21st—July 4th.

Criorhina oxyacanthæ, Mg. Birmingham.

Xylota abiens, Wied. One specimen of this rare species from Birmingham.

Chrysochlamys cuprea, Scop. Hastings; Dover.

Chrysotoxum bicinctum, L. Birmingham.

C. sylvarum, Mg. Dover.

C. 8-maculatum, Curt. Plymbridge, June 25th.

Microdon devius, L. Birmingham. In Verrall's list this is marked uncertain. As three specimens were taken this year, this will satisfactorily establish the species as British.

Conopidæ.

Conops vitellinus, Loew. Three from Birmingham.

Æstridæ.

Gastrophilus equi, F. One from near Birmingham.

Muscidæ.

1. *Tachinidæ.*

Echinomyia grossa, L. Ivybridge, Aug. 11th.

2. *Sarcophagidæ.*

Theria muscaria, Mg. I named a specimen of this species for someone early in the year, but cannot recall my correspondent's name, and I see the species has been recently introduced to our lists by someone, so that in this instance I am forestalled. In Verrall's list it is included among the "probably British" species. Walker does not mention it.

Cynomyia mortuorum, L. The Rev. F. Walker showed me a long series of this fly, taken in Iceland, where he found them lying dead near the windows inside a large building,—if I remember rightly, a church.

3. *Muscinæ.*

Calliphora vomitoria, L. Aberdeen; London. Dr. Walker has taken it in Iceland. The very common species *erythrocephala* is usually mistaken for this species.

C. grænlantica, Zett. Birmingham. Dr. Walker has taken it in Iceland. I have not seen a specimen of this species in London this year, though I took several here in 1888.

4. *Anthomyidæ.*

Lasiops semicinerea, Wied. One taken by Mr. Bradley near Birmingham. This appears to be new to Britain, not being in Verrall's list; but Walker, after his described species of *Anthomyia*, adds, with others, an *A. semicinerea*, Wied. The species is so distinct that it cannot possibly be mistaken.

Lispe tentaculata, De G. Plymouth, August 12th.

5. *Acalypterata.*

Norellia spinimana, Fall. Staines, May 23rd.

Scatophaga squalida, Mg. Aberdeen.

S. stercoraria, L. Dr. Walker found it common in Iceland last summer.

Leria ruficauda, Zett. This species, named for me by Dr. R. H. Meade, is new to Britain. I took one specimen at Reading on May 5th.

Orygma luctuosum, Mg. Salcombe, July 7th, under sea-weed.

Cœlopa pilipes, Hal. Folkestone; Dover, Nov. 2th.

C. frigida, Fall. Scotland, Feb. 22.

Heteromyza atricornis, Mg. One specimen from Hazelhead, near Aberdeen, taken on May 15th by Mr. Terras, is certainly this species, which Mr. Verrall gives as a reputed species.

Spilographa zoe, Mg. Birmingham; London, July 11th.

Tephritis matricariæ, Lw. One specimen taken by Mr. Hall at Dover, in June, appears to be this species, though the wing-markings do not exactly correspond with Loew's photographic illustrations. It is not in our British list, though it is fairly common on the Continent, and I should not like to introduce it on the evidence of one rather doubtful specimen.

Palloptera parallela. Mr. Hall took one at Dover in July. If correctly identified, this species is new to our British list.

Sapromyza platycephala, Sw. I have taken several specimens of this species on the windows of my house in London. It was identified for me by Dr. Meade, and is new to the British list.

Limosina spp. During June and July I took a good number of specimens, representing at least five or six species, but I should not like to answer for the correct identification of any of them. They appear, however, to be *L. sylvatica*, Mg.; *crassimana*, Hal.; *pusilla*, Mg.; *fenestralis*, Rond.; and *cilifera*, Rond.—the three latter names not being in Verrall's list. As *cilifera* was named for me by Meade, it is probably correctly identified, and it is an addition to the British list.

Phoridae.

I have taken in London, during June and July, eleven specimens of a small *Phora* I do not recognize; and have one from Kincardine, taken on June 1st, that appears to be *P. nigricornis*, a species not given in Mr. Verrall's list.

Trineura aterrima, F. London, June 1st; Birmingham.

Hippoboscidae.

Hippobosca equina. New Forest.

129, Grosvenor Park, Camberwell.

SUGARING.

By W. H. BLABER.

THE question of the frequent failure of "sugar" in attracting moths, and what are really the requisites for a successful "sugaring" evening, has of late been much in my mind, and I

was therefore interested to see a note on the subject by Mr. Anderson (Entom. xxiii. 66). The most successful evenings that I have experienced have generally been very warm and close, with heavy, dark clouds, and now and then a few drops of rain; and I remember that one of my very best evenings, which was in August, 1886, had been preceded by a warm day with frequent showers of rain, while the pitchy darkness of the night was rendered all the more noticeable by flashes of summer lightning in the distance. On this occasion moths simply swarmed on the patches of "sugar," and not only there, for numbers were crawling about at the foot of the trees, and as many again kept flying round my lantern. Yet, on the other hand, I have frequently set out on what appeared to me to be a perfect evening for "sugaring," anticipating a numerous gathering at the trees, when, to my disgust and amazement, only two—or perhaps three—moths have deigned to put in an appearance. I believe that some collectors attribute this failure of "sugar" to the somewhat cold and wet summers of the last few years, and I have no doubt but that this has a good deal to do with the matter; but still the summer of 1884, for instance, was extremely hot, and, although I was out night after night, I was far from successful.

The next year, 1885, was also unusually warm, and with the exception of one or two evenings the majority were dead blanks; while in 1886, which was dark and sunless on the whole, I had some most productive "sugarings." It would therefore seem that very hot weather affected the question but slightly, and I have often found that a continued drought is most conducive to the absence of moths, while, on the other hand, I am convinced that much cold and damp, such as was experienced last summer, must have had a most deterring influence upon the emergence of many species of Noctuæ. It appears to me that, however favourable a particular evening may seem, the captures will be *nil* unless the previous fortnight or three weeks have been mild for the time of year, with perhaps a few warm showers of rain, but, above all, an entire absence of cold east winds, so that the moths may have had as favourable a time as possible for emergence. I have hardly ever noticed moths at sugar, however plentiful they may have been previously, if there is the slightest suspicion of an east wind, and I think, therefore, we may presume that on such occasions they do not venture forth from their hiding-places. The last few summers have certainly been most changeable, with much rain and wind: what, for instance, could we expect after the terrific gales and continuous rain of last July and August? I was on this account not altogether surprised, when I visited the New Forest, to find that moths were not to be obtained at sugar, however often one went out for this purpose, for in spite of apparently good evenings there was a certain chill and dampness in the air.

Two other reasons for failure at sugar have also suggested themselves to me, namely, the increasing mildness of our winters, and the frequent gales and heavy rains in the spring. In the first case it seems to me that numbers of larvæ must hatch from the egg long before there is the slightest chance of their obtaining their particular food, and these therefore doubtless perish in large quantities; and secondly, those larvæ which are still small must often be washed off their food-plants and drowned, or are blown from the trees by the strong winds, only to die of starvation. The question is an interesting one, and I therefore hope, with Mr. Anderson, that we may see the opinions of some of our leading entomologists on the subject.

Groombridge, Sussex, Feb. 18, 1890.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. PERRY COSTE, F.C.S.

PRELIMINARY NOTICES.

I.

THE experimental investigation of the chemical characters of those colours whose superb brilliancy or delicate tones, as displayed in tens of thousands of insects, never fail to evoke our enthusiastic admiration and afford us a source of unflagging delight, might, indeed, be thought to offer an enticing field for scientific research. Reasoning deductively, and as merely entomologists, from the data afforded us by the colour variations occasional in all insects; by the different forms that the same species may take in different countries; by the existence of intermediate* species, forming a connecting link between two quite differently coloured species; by the comparison of allied species in which similar markings are dissimilarly coloured; and lastly, by the actual evolution of colour in the same individual insect that we can occasionally observe;† reasoning, I say, from all these data alone, we may draw certain conclusions as to the evolutionary rank of some insect colours. Notably is this possible with regard to reds and yellows; and the views already advanced, for instance, by Mr. T. D. A. Cockerell, in the pages of the 'Entomologist' and elsewhere, will be found anon to be confirmed by the results of direct experiment. But this question of the evolution of red colour in insects was, perhaps, the plainest sailing of all; true we may farther proceed to theorise on the relations of yellow and white, but here the way is apparently not so clear; and the danger of resting satisfied with theoretical results, *unverified*, however satisfactory they seem, becomes soon

* I speak here of colour only.

† *E.g.*, in the newly emerged imagines of *atalanta* and *caia*.

evident. For although, for my own part, I had always inclined to the view that I now find supported by the experiments presently to be described, yet an entomologist who has devoted so much thought and study to the question as has Mr. Cockerell, arrives at an exactly opposite conclusion to my own concerning the developmental relations of these two colours yellow and white. This at once illustrates the necessity of seeking direct experimental evidence as to the correctness of our theories; and it is not a little astonishing—in view of these considerations—that up to the present this work has been left almost wholly untouched, and a masterly inactivity allowed to prevail in this quarter. So far as I can understand, the chemical behaviour of these colours is veiled in an unlifted cloud of darkness, broken only by the light of some half dozen statements, which are either vague, misleading, or incorrect. For instance, Mr. Wallace* states that the red of *Zygæna* is changed to yellow by muriatic acid, whilst that of *V. atalanta* undergoes no such change; a statement of which the first half is certainly quite correct, but the second half very misleading. Again, there is a general statement that the white of butterflies may be turned yellow by alkalis—a statement based on an experiment of Mr. Coverdale's: so far as made concerning *Pieris* it is utterly erroneous. This has already become known to Mr. Cockerell, who remarks† that “alkali will not turn a *Pieris* white to yellow.” He nevertheless makes himself responsible for the statement that the white of several species of Lepidoptera may be changed to yellow by alkalis,‡ a statement that demands careful qualification. And lastly, Mr. Cockerell states that the yellow of a *Colias* was changed to red by potassic cyanide; a phenomenon so extraordinary, and so utterly opposed to every experimental result yet obtained by me, that I must be pardoned for emphatically discrediting it; at least unless Mr. Cockerell can personally vouch for the fact.

This then, so far as I am aware, is the extent of our experimental knowledge of the subject up to the present, and there is very evidently abundant room for research. At last, too, interest appears to be awakening, and as generally happens in such cases, several workers are moving simultaneously. Both Mr. Cockerell and myself would appear to be (quite independently) interesting ourselves in this subject; and the colours of the Echinoderms, Worms, Ascidians, Crustacea, &c., form the subject of a most elaborate spectroscopic research just recently communicated by Mr. MacMunn to the ‘Quarterly Journal of the Microscopic Society’; whereas the colours of plants and flowers have long since been investigated by Sorby, Hansen, Bachmann, Pringsheim, Weiss, Church, and various others.

Now before proceeding further I must disclaim any originality in the first inception of the idea of investigating these insect

* ‘Tropical Nature.’ † ‘Entomologist,’ xxii. 126. ‘Entomologist,’ xxii. 2.

colours. Starting from the first idea, I have been led to others suggesting several lines of investigation which I *can* fairly claim as my own,—at least in this sense, that I do not owe them to others, although very possibly others may have been led to the same ideas; with these I hope to deal further on. But this subject itself was first suggested to me by the remark of Wallace's that I have already quoted. I was reading 'Tropical Nature' some three or four years ago, and, being struck by the statement, made a note of it as a hint for future research. Owing to press of other work, however, my good resolutions were indefinitely postponed, and finally slumbered in forgetfulness. Some time since I came upon my old memorandum of the subject, and my attention was redirected thereto. Although still too busy to spare time for the work, I kept it in mind; and while yet thinking it over, a fresh impetus was indirectly given to my interest in the matter by Mr. Cockerell's article in the 'Entomologist' of January, 1889. Soon afterwards, before commencing any experiments, I wrote out at some length my *à priori* views on the subject, and the lines of investigation proposed to be followed, as well as the classes of results that I anticipated; from this statement I shall have directly to quote some passages. During the spring I commenced a few preliminary experiments, but want of time prevented me doing much just then; and it was not until September that I was able to settle down into regular work. Since then I have been following up the subject, but lack both of time and opportunity have still conspired to prevent any rapid progress. This may be readily understood when I say that daylight is essential to this work, and the only possible opportunity of daylight working that I have is on Sunday mornings; most of these since August I have given up to the work, and have already got through many hundreds of experiments.

All of these, however, I regard as merely a preliminary exploration. I have now fairly satisfied myself as to the methods and reagents likely to prove serviceable, and am not without hope of soon being in a position to communicate the results of a very extensive series of investigations. So far as I can at present foresee, I anticipate having abundant time and opportunity for this work after next autumn onwards, and nothing will then be wanting me but *material* in the shape of insects.

The results already arrived at, although confined entirely to British insects, and therefore covering a very small field, I am, nevertheless, induced to publish without further delay, and that for several reasons. In the first place, they are, so far as they go, fairly complete; and although—since most of my results are negative—very disappointing compared with my *à priori* anticipations, yet they may at least guard any future worker from losing time in experimenting with useless reagents or on immovable colours.

Secondly, since I do not know whether any others might presently take up the inquiry, I—not unnaturally—wished to establish my priority if possible; and I now appeal to any of my readers who have *not* yet worked at this, to leave me alone for two or three years to carry on what I have begun. This is universally conceded by the scientific code of honour to every worker on a new line, and I must ask the customary honourable treatment of being left to finish my work myself. Of course if any others, as for instance Mr. Cockerell, have already struck out the same line of work as myself, that is quite another thing; and although I shall, naturally, be disappointed to find myself not alone in the field, yet evidently their right to continue the investigation is every whit as good as mine, and the mere priority of publication does not entitle me to cry “hands off!” In such case we can only continue our collateral investigations in friendly rivalry. But I do emphatically reserve my rights as against any who might have their attention directed to the subject by merely reading this communication.

And, thirdly, there is a very practical inducement to make known my present results, for I am most anxious to, if possible, examine the colour of typical Lepidoptera of all the chief families, and from all parts of the world, so as to arrive at a fairly comprehensive conclusion concerning the chemical and genetic relationships of these colours. It has therefore appeared to me not improbable that many entomologists whose interest in Lepidoptera is not confined to merely collecting them, but who rather regard the study from the scientific standpoint, might feel inclined to assist me by sending material for my investigations. I have myself none but common English species, and therefore all brightly coloured Lepidoptera, whether European or tropical, will be most welcome. To obtain the supply that I want from dealers would be practically impossible, and furthermore extremely wasteful; for working as I do, such very small portions of the wing are used in each experiment, that a *single wing* of *e.g. atalanta* size would, if unicolorous, amply suffice for my experiment on that species.*

Now there must certainly be numbers of entomologists possessing damaged and broken specimens that are useless for their cabinets and exchanging: if they will send me a wing or two each

* Where the wings are mottled with several colours, of course *one* wing of this size would not suffice. Any insects thus sent me will need no packing, but may be sent in simply a stout envelope; since the preservation of the body is unnecessary, the most convenient mode would be to send simply *detached* wings. To be of real service all should be *named*, at least so far as regards genera and family, the specific name is of less account; and I would greatly desire the locality (Asia, Africa, Europe, &c.) to be stated. It must be remembered, however, that a wrong naming will be far worse than none at all; and in any case of even uncertainty, it will be better to let me take my chance of getting the insects named at the Museum or elsewhere. All such enclosures may be addressed to me at “Ravenshoe,” 142, Burnt Ash Hill, London, S.E.

of such specimens, I shall feel immensely indebted to them, and think I can promise that such kindness will not be wasted. Now this appeal I could not well make without first showing "cause why"; but I hope that the preliminary results to be detailed will be held to constitute sufficient justification for my request, and to exonerate me from my charge of presumption in making it.

I might also add that it is not my wish to stop short at the colours of the lepidopterous imagines, but I hope further to examine somewhat the colours in Coleoptera, Neuroptera, &c., and also in the *larvæ* of Lepidoptera. This last will be an especially interesting investigation in every way. For instance, will there be found a clear relation between the chemical character of the larval and imaginal colours in each species? or will the larval colours in any genus be related *inter se*, as those of the imagines, but independent entirely of the latter? and what differences may not arise from the fact that in the imago of the Lepidoptera the colours are on scales, whilst in the larvæ on hair and skin, in the Coleoptera on horny elytra, and so on? These hints are merely indicative of the interest presumably attaching to such an enquiry.

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

ON THE IDENTITY OF *DIANTHÆCIA CARPOPHAGA* AND *D. CAPSOPHILA*.—In the March number of the Ent. Mo. Mag. Mr. W. F. H. Blandford shows good reason for sinking *D. capsophila*, Dup., as a species, and reducing that insect to its proper rank as a local form of *D. carpophaga*, Bork. At a meeting of the South London Entomological and Natural History Society in 1888, I read some notes on *D. nana*, Rott. (= *conspersa*, Esp.), and *D. compta*, Fab., and at the same time made some remarks on the probable consanguinity of those insects. In the discussion which followed, other species of *Dianthæcia* were adverted to, and I incidentally expressed an opinion that *D. capsophila* and *D. carpophaga* were specifically identical. This view I had long entertained, and the better I became acquainted with the various forms of the latter insect, so much the more was I convinced that *capsophila* was only a specialised form of it. Four or five years ago, Mr. Blandford very kindly gave me two specimens of a *Dianthæcia* he had obtained in South Wales. As regards colour these specimens are not exactly like any example of *D. capsophila* or *D. carpophaga* in my series of these insects; but as Mr. Barrett has pointed out (E. M. M., 90), there is not the slightest difference in the character of markings, and in this respect they agree with both *capsophila* and *carpophaga*. This is a fact which Mr. Blandford may remember I called his attention to when he compared his insect with my *Dianthæciæ*. It should be added that there is no character in the larva of *capsophila* which will serve to specifically distinguish it from that of *carpophaga*.—RICHARD SOUTH.

DIANTHÆCIA CUCUBALI, &c., IN AUGUST.—I find, on referring to notes, that whilst in Gloucestershire, on the Cotswolds, last season, I took at

sugar on August 19th a freshly emerged specimen of *Dianthæcia cucubali*, and on August 30th I captured a solitary specimen of *Emmelesia albulata*, disturbed from amongst a great quantity of its food-plant, the yellow rattle. Would these be deferred emergences or a second brood?—T. B. JEFFERYS; Bath, March 5, 1890.

[*D. cucubali* has been taken and bred in August, and *E. albulata* captured in September. *Vide* Entom. xiv. p. 214; vi. p. 429.—ED.]

ABUNDANCE OF *VANESSA CARDUI* IN NEW ZEALAND. — Since my last note (Entom. p. 20), I have observed *Vanessa cardui* in increasing numbers. During October I saw over six specimens in different localities near Wellington; while on Nov. 3rd sixteen or seventeen specimens were to be seen in openings in the forest near Karori. I also observed several of these butterflies in the middle of the month, during a brief stay at Palmerston North, a locality some eighty miles to the north of Wellington. In England I believe it is the fashion to attribute the sudden appearance of certain species of insects to migration from the Continent of Europe, but in New Zealand such explanations are obviously quite untenable. I am inclined to believe that the abundance, or the reverse, of a given species, is largely determined by certain conditions of existence, with which we are at present most imperfectly acquainted, and that in the case of a periodical insect like *V. cardui*, these conditions only recur occasionally, the species being so extremely rare during the intervening seasons, that it altogether escapes our observation. It is, of course, almost certain that insect migrations sometimes occur, but we should always remember, that in animals endowed with such enormous reproductive powers as insects, any circumstance tending to lessen the rate of mortality in a given species, would at once cause its numbers to increase with almost incredible rapidity.—G. V. HUDSON; Wellington, New Zealand, November 20, 1889.

TEMPERATURE AND MELANISM.—At a meeting of the Entomological Society, on December 4th, Lord Walsingham stated that forcing pupæ produced in the imago a result the opposite of melanism. According to the theory I have advocated (Canad. Ent. 1888, p. 86), such colour-changes are more strictly connected with the rate of development than with heat or cold as such. If so, forcing throughout the whole or a large part of an insect's life as a pupa ought, as stated by Lord Walsingham, to produce the reverse of melanism; but if an insect is subjected to great cold throughout the winter, and suddenly to great heat in spring, it ought (according to my theory), as a rule, to show some tendency towards melanism. Now many of your readers breed Lepidoptera; will not some one try some experiments to prove the point? An experiment which might be tried by any breeder of Lepidoptera this spring is as follows:—Take pupæ which have hybernated, and about a fortnight before the normal time of emergence transfer them to a hot-house, or to some heated place. This might bring the imagines out a few days earlier; but as the pupæ wintered in the mild English climate, I should doubt whether it would produce any perceptible effect on the colouring of the insects. But should it produce any effect, a melanic or dusky tendency would be favourable to my theory, while the opposite tendency would seem to contradict it. These "temperature-forms" are rather fully discussed in Entom. xxii. 27—29, to which I would refer the reader. Temperature "melanisms" are generally small, greyish, suffused or dusky, and yellow and other bright colours are paler or partly

suppressed, though there may be a tendency to pink. Ordinary melanic races, such as occur in the North of England, seem to be entirely different, and due to different causes.—T. D. A. COCKERELL; February 26, 1890.

PHIGALIA PEDARIA (PILOSARIA) IN JANUARY. — As an example of the effect of the mildness of January, I may mention that I captured a male *P. pedaria* on the night of the 11th of that month, at 8.45, the temperature being at the time 50°. It was at rest on a gas-lamp (at Balham), and apparently quite recently emerged. Upon referring to my notes of the last ten years, I find the earliest date I had hitherto taken this species was on February 19th, 1881, and that the first week in March is the usual time for its appearance.—F. W. FROHAWK; Balham, S.W.

During a short walk on January 26th, I took five *Phigalia pedaria* and half a dozen *Hybernia leucophæaria*, at rest on the sheltered sides of fences, excellent evidence this of the mildness of the season; we have March in January.—F. W. BIDDLE; Lanherne, Albemarle Road, Beckenham.

Phigalia pedaria has appeared here very early this year. I took seven specimens on January 16th. The earliest date at which I have previously seen this species is February 16th.—WM. REID; Pitcaple, Aberdeenshire.

[The usual time for the appearance of this species is perhaps between the middle of March and the middle of April, but it has been observed as early as November and December, and so late as the middle of June. *Vide* Entom. xx. pp. 64, 110; xxi. p. 91; xxii. p. 113.—ED.]

ARCTIA CAIA.—I found some thirty larvæ at the beginning of June last year, and as I had heard that feeding them on coltsfoot produced the best varieties, I reared them on this plant alone, but of the imagines bred therefrom not one was a variety. Two of the females deposited ova, and when they hatched I gave the larvæ lettuce that was seeding to feed on. This food getting scarce when they were about half-grown, I fed them on a weed that grows among the turnips; the farmers call it "rednees," a species of *Persicaria* I suppose it is; and they fed on it ravenously. Some two hundred of them refused to thrive, and I planted them out to hibernate. About 200 insects emerged; a great many were cripples, but 50 of the specimens were good varieties: hind wings buff to very dark brick-red, approaching a suffused smoky colour; some have beautifully marked fore wings. On the whole I am very well pleased with the result.—WILLIAM JOHNSON; Bank-houses, Aspul, near Wigan.

GAS-LAMP ENTOMOLOGY.—As a doubt appears to exist in the minds of some entomologists as to whether the Sphingidæ are prone to the attractions of the gas-lamp, the following incident may be worth recording. It is some years since I systematically worked the lamps, but I well remember an occasion, when having spent the evening in mothing along the hedge-rows of what was then known as Burnt Ash Lane,—possibly one of the best suburban hunting-grounds in the district,—and darkness having some time set in, I was preparing to work the gas-lamps on my way home. The first few of these stood well out in the open, and on approaching number one I beheld what had the appearance of a bat suspended from the top rail of the frame, but on going forward to secure my prize found, instead of the bat, a couple of *Smerinthus populi* hanging on to the iron, side by side, within an inch of each other; on the next lamp visited was another; and on the next, a fourth;—all within a distance of some hundred

yards. My own experience is that it would be much more difficult to say which families are not attracted by gas-lamps than which are, even such sun-loving species as *Pieris rapæ* and *Vanessa atalanta* having been found in such situations, the fact of their returning after being driven away proving, I think, that the bright flame had some fascination for them. A word as to time: some species of moths will, doubtless, come to light even before the twilight has died away, but it is not until darkness has long set in that lamping becomes profitable; and if we are content to spend the still, small hours of a warm dark morning in searching the gas-lamps in any suitable locality, we are not likely to return home with many empty boxes; not only are moths then more common than in the earlier part of the evening, but are more easily secured —R. ADKIN; Wellfield, Lewisham, March, 1890.

There are a few very curious facts in Mr. Arkle's article (Entom. 100), under the above heading, which appear (if correct) to show the habits of Lepidoptera in the vicinity of Chester to be peculiar to that locality. I think every collector of experience will admit that nearly all the nocturnal flying Sphingidæ are attracted by light: *atropos*, *convolvuli*, *galii*, *livornica*, *celerio*, *elpenor*, *ocellatus*, *populi*, and *tiliæ* are well-known examples, and *Smerinthus populi* is often very abundant. The *Tæniocampæ* in this district are common visitors to the lamps, especially *T. gothica* and *T. instabilis*; *Plusia gamma* is generally abundant, and *Dicranura vinula* not scarce, the latter sitting on the ironwork of the lamp like many other large species; *Spilosoma fuliginosa*, although by no means common here, turns up sometimes at light; and *Hepialus lupulinus* is a pest, both in rooms and at the street lamps. Some of the appearances are also a little peculiar at Chester. I see Mr. Arkle takes *Diurnea fagella* and *Lemnato-phila phryganella* at light in July; we take the former here in March, April, and May (male). Its popular name used to be the March-dagger. The latter flies in our woods in November. I see *Tortricodes hyemana* occurs at light at Chester in August. This is worth noting, for with us it is one of the earliest species to occur in our oak woods, and is over by the end of April. Mr. Arkle's list is long, but, including Tortrices, I think most metropolitan collectors could easily double it. It is astonishing what species come to light when that means of capture is steadily worked. I have taken day-flying insects, like *Acontia luctuosa* and *Saturnia pavonia* (*carpini*), in this way; and on one memorable evening, I had forty-one species present themselves between 11 p.m. and 1.30 a.m.—C. FENN; Evenden House, Burnt Ash Hill, Lee, S.E.

During several years' experience, I have never seen a single species of the Sphingidæ at lamps. To the lists already given I can add *Dasypolia templi*, *Xylina semibrunnea*, and *Eucosmia certata*. I have seen both *Tæniocampa gothica* and *stabilis*, as a further proof that some of the *Tæniocampa* are attracted by light.—T. B. JEFFERYS; Bath.

EARLY EMERGENCE OF *S. BILUNARIA*.—On the 30th January I chanced to go into the cold saddle-room where I keep my pupæ, and found, to my astonishment, that a male and female of the above had emerged. Before their wings had dried they paired, and on the following day the female laid eggs, which are apparently fertile. Subsequently others emerged, as follows:—February 2nd, one female; 3rd, one male; 6th, one female; 7th, one female; 13th, one female; 14th, one male. Newman gives April as the date of emergence! As a further instance of

this very mild winter, I may add that in the neighbourhood of Weymouth to-day I saw a swallow in full bloom.—CHAS. E. PARTRIDGE; The Castle, Portland, February 14, 1890.

AGROTIS ASHWORTHII Doubl. = A. CANDELARUM, Stdgr. — Mr. W. Gardner is justifiably enthusiastic over the beauty of *Agrotis ashworthii* (Entom. p. 5), but as to its individuality it must be confessed that it is generally admitted to be merely an illustration of the melanism, so commonly occurring in Great Britain, of common Continental species, and by no means entitled to rank as a separate species. The typical representative *A. candelarum* Stdgr. = (*candelisequa* Hb. 397), is of no rare occurrence throughout Europe. — N. F. DOBRÉE; The New Walk, Beverley, E. Yorks, February 3, 1890.

LARVÆ OF BOMBYX RUBI.—On the 1st December I found several larvæ of the above, at an altitude of 1100 feet, crawling on the heather amongst the unmelted snow, though there was no sunshine, and we had had a week's hard weather. Again on the 15th, on the same ground, I found larvæ, after an exceptionally wet and rough week. Surely this is unusual? —CHAS. PARTRIDGE; Farchynys, Dolgelly.

VANESSA IO AT CHRISTMAS.—Whilst walking about the New Forest, last Christmas Day, I had the pleasure of watching a specimen of the above butterfly on the wing; it sported about ivy for some time, but did not settle upon it; eventually it espied me, and alighted upon the trunk of an oak, within a foot of my head, fanning its beautiful wings, in which position I left it. There were numerous hollies around, looking so fresh and green, and the weather being simply glorious, that really *io* did not look out of season.—J. HY. FOWLER; Ringwood.

VARIATION IN SIZE OF COLEOPTERA.—In connection with the variation in size of certain species of Coleoptera, mentioned in Mr. Cockerell's recent papers on variation (Entom. xxii. p. 245), it may be of interest to record the following measurements of two species in my collection, which I think are unusually divergent in size for specimens of the same insect taken under almost identical conditions:—(1.) *Lasiorhynchus barbicornis*, male 34, 24, and 11 lines; female, 21 and 14 lines. (2.) *Æmona hirta*, female, 12 lines, male, 9 and 5 lines.—G. V. HUDSON; Wellington, New Zealand, November 20, 1889.

EARLY APPEARANCE OF HYBERNIA MARGINARIA, &c.—Myself and a friend have taken the following moths this year; and as some of them are much earlier than I have ever taken them before, I thought it would be of interest to some of your readers. January 10th, *Hybernia rupicaprararia*; 31st, *Anisopteryx æscularia*. February 1st, *Hybernia marginaria* (*progemmaria*). I may add that we also took nineteen *Phigalia pedaria* (*pilosaria*) at lamps, January 31st.—W. E. BUTLER; 91, Chatham Street, Reading, February 14, 1890.

As an evidence of the great mildness of the month of January, my son took a fine specimen of *Melanippe fluctuata* in our garden on the 2nd of this month. I think this is an unusually early capture of even this very common species. It may interest your readers to know that last season I took a specimen of the black form of *Hemerophila abruptaria* in this neighbourhood.—DOUGLAS A. ONSLOW; 28, Carlton Hill, N.W., Feb. 22, 1890.

ANGERONA PRUNARIA. — Owing to illness since 1887 I have been unable to continue the experiments shadowed forth in my article (Entom. xx. 36), and, as I do not see any likelihood of my resuming them, perhaps some other entomologist will kindly take up the subject and render it more justice than I have been enabled to do. I have, however, managed to rear a few more notable aberrations of *prunaria* described below, *viz.*, a speckled variety of the male with irrorated spots on basal half of hind wings, suffused, forming a sooty blotch; a palish example of the banded variety of the male, with hind wings, colour and markings resembling the ordinary female variety; and a specimen of the common type of the female form of a very pale straw-colour, with a few indistinct spots of the palest orange chiefly at costal and outer edges of wings. — GEO. J. GRAPES; Berkeley Villa, 34, Charlwood Road, Putney, S.W., February 6, 1890.

CHEROCAMPA CELERIO IN QUEENSLAND. — This insect is fairly common here, and it is, I think, interesting to note that the imago appears in September (our spring) and October. The larva occurs in the following month, and feeds up very rapidly; all mine had pupated before the end of November. A green variety of the larva is found commonly, as in the case of *C. porcellus* and *C. elpenor*. Here the larva feeds on grape-vine, a species of wild vine, and on fuchsia. I send this note, because I see that Mr. Hellins, in Buckler's 'Larvæ,' only mentions vine as food-plant, while only the brown variety of the larva is figured. To the accuracy of that figure I can bear testimony. — (Rev.) C. D. ASH; Southport, Queensland, Dec. 16, 1889.

Is **CÆNONYMPHA ARCANIA**, Linn., A CASUAL VISITOR? — On overlooking a cabinet containing *Rhopalocera* collected by me when a boy, and which had not been added to or even opened, except to add fresh camphor, for nearly twenty-four years, I found two specimens of the above-mentioned insect. I cannot account for their presence in my cabinet, except that I may have caught them, not knowing what they were; certainly I have no recollection of buying any as a schoolboy. Most of my collection was made on the borders of Dorset and Devon, within a few miles of the sea. — JOHN H. STILL; Langstone, Horrabridge.

[Although it has a wide distribution throughout Europe, *Cænonympha arcania* is a local species, but in nearly all places where it occurs it is common. Mr. De Vismes Kane, in his 'European Butterflies,' says that it is abundant in most parts of France. A form of the species, known as *satyrion*, Esp., affects the more elevated meadows of Switzerland, whilst at lower altitudes *darwiniana*, Staud., another form, is found. This last is intermediate between var. *satyrion* and the type. Stephens, in 'Illustrations of British Entomology,' *Haustellata*, i. p. 69 (1828), includes this species, under the name of *Hipparchia arcanius*, on the slender evidence of a single specimen in Mr. Plastead's collection, which was supposed to have been captured in England. Wood and Curtis both figure this specimen, and the last-named author, in his 'British Entomology,' Lep. i. p. 205, says of it:—"captured by Mr. Plastead, it is understood, on the borders of Ashdown Forest." — ED.]

VARIATION OF CHRYSOLOPHUS SPECTABILIS. — During a lengthened stay in Victoria, in the present year, I had good opportunities for collecting and observing the habits of several species of Australian Coleoptera. Soon after commencing to collect, in January, I became impressed with the great

variation of several species, and prominent among them being *C. spectabilis*. In the Nilumbik Valley, eighteen miles north-east of Melbourne, the species is common, and inhabits the low vegetation; I obtained all my specimens on the dark green boughs of the young black wattles (*Acacia decurrens*). As evening approaches the beetles ascend the stems of the plants, and alternately move slowly and cautiously along the boughs, and resting motionless for some time, when in the latter position the slightest artificial movement of the bough caused the insect to drop suddenly into the long grass beneath. It is, however, more the variation of the species than its habits that I desire to record. I regret that I have not the original description in my possession, but the species is undoubtedly subject to great variation, my specimens ranging from a pale green ground to dark brown or black; some are richly and regularly dotted with gold on a green ground, while others are marked with irregular black patches or dull green and bluish grounds. I have one bright burnished specimen and one black, and other intermediate forms; the species also varies greatly in size in both sexes. When searching for the insects I observed that the dark forms were more difficult to detect on the boughs than the gold-dotted or pale green varieties. I may also mention that last spring and summer were the driest and hottest on record in Victoria, but how such affected insect-life as compared to previous seasons I cannot say. Mr. Cockerell's appeal to entomologists to "take careful notes of all varieties they meet with from time to time, and especially the conditions under which they exist," is certainly to the point, and all—beginners particularly—would do well to act on the suggestion. The chemistry of their food-plants in each season will probably have to be worked out, as having special bearing in all stages on the variation both of the larva and imago.—W. W. SMITH; East Belt, Ashburton, New Zealand, Nov. 25, 1889.

NOTES ON THE SEASON 1889.—On Good Friday I journeyed to Windermere to look for the larvæ of *Laverna lacteella*. Few collectors can see the difference between this species and *L. paludicolella*, Doubl. The food-plant, *Epilobium hirsutum*, was just peeping above ground, and I collected all I could find, hoping that either ova or larvæ might be thereon; but when I examined it at home I could only see two small larvæ; these were obscure whitish in colour, with black heads, and one of them produced a moth in June. In trying to force imagines a month or so earlier from the mines and cocoons I had gathered the previous autumn, I was not eminently successful, as from about 400 larvæ of *Nepticula gei* and *N. splendissimella* I only bred about a dozen specimens. As, in subsequently searching for them, I could find very few empty cocoons, I concluded that owing to the cold weather the larvæ had not vitality enough to undergo the change. A similar unsatisfactory result befel a canister-full of *Nepticulidæ* and *Lithocolletis caledoniella* from Renfrew. *Nepticula aucupariæ*, *N. tityrella*, and *N. continuella* all did badly. The only species I bred in any number was *N. tilia* and about twenty-five specimens of *N. desperatella*. Last year I could not find any larvæ of *N. minusculella*, but six imagines were bred in 1889 from pupæ obtained in 1887. *Lithocolletis* fared badly; a very few *L. kleemannella* and *L. stettinensis*; while of *L. bistentella* I only got one specimen. Among the larger moths I may mention one fine *Cabera rotundaria*. During the season I visited Windermere on several occasions, but scarcely saw a *Geometra*, and *Tortrices* and *Tinæ* were very poorly

represented. I obtained one example of *Penthina capræana*, a species of which I had not taken a specimen since 1847, when I met with it at Swanscombe in Kent. *Nepticula intimella* were scarce, but on the wing much before the usual time. About the 20th of May I went on the moor above Stoneyhurst College and found moths abundant, and quite two weeks earlier than usual; *Hadena glauca*, *Acronycta menyanthidis*, *Nemophora pilella*, *Gelechia longicornis*, and a fair number of *Thecla rubi* were flying about; fortunately I had some 150 boxes with me, and these were quickly filled. About the second week in June I had a turn on the mosses, where I found some fine *Cænonympha typhon*; also *Hyria muricata* and *Acidalia fumata*, but scarcely anything else, although the mosses usually teem with insect life. I next had a turn on Arnside for *Lycæna astrarche* var. *salmacis*, but only got about half a dozen specimens. There was a high wind and a bright sun; they were no sooner in the net than out again. About this time I brought in my pots, in which I had put fourteen larvæ of *Cidaria reticulata*, with plenty of food. I did not expect to breed above three or four; however, eleven specimens came out, also a few *Penthina postrema* and *Coleophora fuscuprella*. Early in July I went on the moors several times; no Macros, only a few large *Eupithecia satyrata*, first time in the district. I think they differ from my other specimens from various localities. *Penthina sauciana* and *Grapholitha geminana* were fairly common; the fine hot weather was favourable for the larva. In August I spent most of my time among Nepticulæ, and found them scarcer than usual, the commonest being *N. desperatella*. I found a good many extending over two months. On the way to Stoneyhurst *N. tilix* was not as common as last year, when I found eight in one leaf; *N. cryptella* and *N. serella* not many. Of the birch-feeders I found large numbers were killed in the mine by the hot sun. As far as I hear from my friends they one and all give a gloomy account of their season's work. I found *Nepticula* larvæ very sparing, even in October. I went for *N. minusculella* larvæ on the 1st of the month and only found four. On the 2nd I saw plenty of mines on the oak and nut in our Pleasure Gardens, and, strange to say, seeing a spotted leaf of the nut I turned it up, and there was a full-fed larva, with its rugged rough case, of *Coleophora fuscuprella*. The usual places for me to get this species are nearly forty miles distant. I must note the capture of a fine *Ephestia semirufa* by my wife, in the kitchen, about the 16th of September.—J. B. HODGKINSON; Ashton-on-Ribble.

LEPIDOPTERA IN THANET.—It may interest some of the readers of the 'Entomologist' to learn a few of the more important captures that have been made within the last few years, by local collectors, in the neighbourhood of Ramsgate (Entom. xxi. 322). Leaving out those species which are of almost universal distribution, we have taken among the Rhopalocera:—*Vanessa c-album* (once, at Sevenscore), *V. polychloros*, *Melanargia galatea* (common), *Thecla quercus*, *Lycæna albus*, *L. medon*, *Colias edusa*, *C. hyale* (once), *Vanessa antiopa* (was undoubtedly seen last September, but was not captured). Among the moths:—The three species of *Smerinthus*, *Sphinx ligustri* (common), *Acherontia atropos*, *Charocampa porcellus*, *C. celerio*, *Macroglossa stellatarum*, *Deilephila galii* (was taken in 1888), *Deiopeia pulchella* (has been twice taken), *Gastropacha quercifolia*, *Dicranura bifida*, *Acronycta aceris*, *Eremobia ochroleuca* (by day, on knapweed), *Calymnia diffinis*, *Cerigo matura* (cytherea), *Leucania comma*, *Bryophila perla*,

Aporophyla australis, *Apamea ophiogramma*, *Miana literosa*, *Agrotis suffusa*, *A. saucia*, *A. cursoria*, *Triphana ianthina*, *T. fimbria* (once), *T. orbona*, *Xanthia silago*, *Hadena serena*, *Polia flavocincta*, *Calocampa vetusta*, *C. exoleta*, *Xylina semibrunnea*, *Epione apiciaria*, *Selenia lunaria*, *Eugonia alniaria* (once), *Cidaria miata*, *Aspilates citraria*, *A. gilvaria*, *Strenia clathrata*, *Fidonia atomaria*, *Melanippe procellata*, *Eubolia palumbaria*, *E. bipunctata*, *Mesotype virgata* (*lineolata*), and *Anaitis plagiata*. Although Thanet is destitute of woods, there are several snug little clumps of trees admirably adapted for sugaring. The ivied walls of Richboro' Castle are truly a magnificent sight, but can with difficulty be reached after dusk.—T. WILLSON; Dudley House, Ramsgate, March 6, 1890.

LIST OF INSECTS OBSERVED ON LUNDY ISLAND, JULY 13TH, 1888.—Lepidoptera-Rhopalocera:—*Pieris brassicæ*, *P. rapæ*, *Satyrus ianira*, *Cænonympha pamphilus*, *Polyommatus alexis*, *Vanessa cardui*. Lepidoptera-Heterocera:—*Camptogramma bilineata* (smaller than on the mainland), *Melanippe fluctuata*. Coleoptera:—*Ocypus olens*, *Telephorus melanurus*, *Calathus cisteloides*. Hymenoptera:—*Apis mellifica*, *Bombus muscorum*, *Chrysis ignita*, *Halictus albipes*, *Sphecodes gibbus*, *Formica nigra*, *F. rubra*. Diptera:—*Chrysotoxum fasciolatum*, *Scatophaga stercoraria*, *Musca cæsar*, *Calliphora vomitoria*, *Tipula oleracea*, *Anthomyia lucorum*. Hemiptera:—*Ptyelus*. Orthoptera:—*Perotettix pedestris*, *Forficularia auricularia*. Arachnida:—*Epeira diadema*.—(Rev.) F. A. WALKER; Dun Mallard, Cricklewood, March 11, 1890.

ADDITIONS TO THE NEWBURY LIST OF MACRO-LEPIDOPTERA.—Although the entomological season of 1889 proved to be most unsatisfactory, I was successful in adding several new species of Macro-Lepidoptera to our Newbury list. They are as follows:—*Eurymene dolobraria*, *Pericallia syringaria*, *Eugonia erosaria*, *Acidalia holosericata*, *Bapta temerata*, *Emmelesia adaquata*, *Eupithecia pulchellata*, *E. plumbeolata*, *E. irriguata*, *Lobophora sexualisata*, *Eubolia cervinaria*, *Chesias spartiata*, *Nola cucullatella*, *Trichiura crategi*, *Saturnia pavonia* (pupæ), *Acronycta leporina*, *Hydræcia petasitis*, *Noctua dahlii*, *Panolis piniperda*, *Tæniocampa miniosa* (larvæ), *Tethea retusa*, *Dianthæcia capsicola*, *Asteroscopus sphinx*, *Heliaca tenebrata*.—M. KIMBER; Cope Hall, near Newbury.

PARASITES ON MOTHS.—The acarid moth-parasites, referred to by your correspondents, also occur in America. On August 25th, 1887, I took a Noctuid by the Blue River, Dillon, Colorado, with a red mite on its abdomen. Unfortunately, I did not ascertain what species the mite belonged to.—T. D. A. COCKERELL; February 25th, 1890.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—March 5th, 1890.—Capt. Henry J. Elwes, F.L.S., Vice-President, in the chair. Mr. G. H. Kenrick, of Edgbaston, Birmingham, and the Rt. Hon. Lord Rendlesham, of Rendlesham Hall, Woodbridge, Suffolk, were elected Fellows; and Mr. J. P. Mutch was admitted into the Society. Mr. C. G. Barrett exhibited a number of specimens of *Dianthæcia carpophaga*, Bork., bred by

Mr. W. F. H. Blandford from larvæ collected near Tenby, Pembrokeshire, on flowers of *Silene maritima*. He remarked that the series included a number of forms intermediate between *D. carpophaga* and *D. capsophila*, and established the fact that the latter is only a local variety of the former. Mr. W. H. B. Fletcher, Mr. Blandford, Mr. M'Lachlan, and the chairman took part in a discussion as to the identity of the supposed species. Mr. Barrett further exhibited a specimen of *Dianthæcia luteago*, var. *barrettii*, Db., also bred by Mr. Blandford from a larva found at Tenby, and he remarked that the species had not previously been taken in England; also a long series of forms intermediate between *Catoptria scopoliana*, Hw., and its small variety *parvulana*, Wilk., collected by Mr. E. Bankes, Mr. Fletcher, Mr. Vine, and others, in Sussex, the Isle of Wight, and Pembrokeshire; also a specimen of *Botys mutualis*, Zell.,—a species widely distributed in Asia and Africa,—taken by Mr. C. S. Gregson near Bolton, Lancashire. Mr. A. F. Griffith exhibited and made remarks on the following:—two specimens of *Myelois pryrella*, taken in the London Docks in 1888, and, for comparison, a series of *M. ceratonix*; two specimens of *Penthina grevillana* and a series of *P. pralongana*, taken in Sutherlandshire, and, for comparison, a series of *P. sauciana*, var. *staintoniana*; three specimens of the form of *Exapate* named *duratella*, with two of the ordinary *E. gelatella*, bred from larvæ taken in Sutherlandshire on *Myrica gale*; one specimen of *Incurvaria tenuicornis* and four of *Nemophora pilella*; three specimens of *Ornix fagivora* from Cambridge; also two specimens from Sutherland and five from Abbot's Wood, Sussex, of a form apparently allied to *Tinea rusticella*, with specimens of the latter from Sutherlandshire and Brighton for comparison; also two specimens of a unicolorous variety of *Hypermercia angustana*, from Horning, Norfolk. Mr. H. Goss exhibited several abnormal specimens of *Chelonia caia*, bred last December. The object of the exhibition was to show the effect produced by forcing the larvæ, and subjecting them to unusual conditions. It was stated that the peculiarity of the colour of the hind wings of the female parent had not been transmitted to any of the offspring. Mr. Blandford referred to two specimens of a species of *Cardiophorus*, from Tenby, which he had exhibited at the August meeting of the Society as *Cardiophorus cinereus*, and stated that subsequent investigation had led him to hand them to Mr. Champion for determination. Mr. Champion was of opinion that they did not belong to the same species; that one of them was *C. asellus*, Er., and the other, probably, *C. equiseti*, Hbst., a species new to this country. Mr. C. J. Gahan read a paper entitled "New Longicornia from Africa and Madagascar." Capt. Elwes read a paper entitled "On a new species of *Thymara* and other species allied to *Himantopterus fuscinervis*, Wesmael." Mr. M'Lachlan made some remarks on the subject in connection with an examination and drawing of the type of *Himantopterus* made some years since. Dr. Sharp read a paper entitled "On some Water Beetles from Ceylon." Mr. J. J. Walker, R.N., communicated a paper entitled "Notes on Lepidoptera from the Region of the Straits of Gibraltar." Mr. F. Merrifield, Mr. B. G. Nevinson, Capt. Elwes, and Mr. G. Lewis took part in the discussion which ensued. It was announced that papers had also been received from Mr. E. Meyrick, Prof. Westwood, and Mynheer P. C. T. Snellen; but in consequence of the lateness of the hour the reading of them was postponed to the next meeting.—H. Goss, *Hon. Sec.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.
 —January 23rd, 1890.—T. R. Billups, F.E.S., President, in the chair. Messrs. G. A. Lewcock, of Islington; W. Gardner, of Liverpool; and P. Bright, of Bournemouth, were elected members. The Treasurer having submitted his balance-sheet, showing a good balance to the Society's credit, the Secretary read the Council's report for 1889, from which it appeared that 44 members had been elected during the year, making a total membership of 223, consisting of 6 honorary, 3 life, 47 country, and 167 full members. The election of officers was next proceeded with, and resulted as follows:—Mr. J. T. Carrington, F.L.S., President; Mr. W. H. Tugwell and Mr. J. Jenner Weir, F.L.S., &c., Vice-Presidents; Mr. E. Step, Hon. Treasurer; Mr. W. West, Hon. Curator; Mr. D. J. Rice, Hon. Librarian; Mr. Barker and Mr. D. F. Rice, Hon. Secretaries; Messrs. R. Adkin, F.E.S.; T. R. Billups, F.E.S.; T. W. Hall, F.E.S.; J. R. Wellman; R. South, F.E.S.; C. A. Briggs, F.E.S.; and C. G. Barrett, F.E.S., Council. The retiring President then read his address, and the meeting closed with votes of thanks to the various officers.

February 13th.—J. T. Carrington, President, in the chair. Mr. Barrett exhibited a long series of *Phycis adornatella*, Tr., from various localities, and remarked that some fifteen or twenty years ago a form of this species was obtained from the west of England, which differed from the specimens obtained at Box Hill, Surrey; the chief distinguishing characteristic being that the western specimens had a white fascia; this form was considered by Prof. Zeller as a distinct species, and it received the name of *subornatella*; in the course of time specimens were obtained from other localities, which were intermediate between the two forms, and it had now been decided that *subornatella* was only a variety of *adornatella*. Messrs. South, Adkin and Tutt made some remarks relative to this exhibit. Mr. Barrett, on behalf of Mr. Vivian, exhibited *Homæosoma sinuella*, and a variety of *Hesperia lineola*, taken in Cambridgeshire. Mr. Moore, a collection of Lepidoptera, Coleoptera, &c., from the coast of Labrador; and Mr. Weir pointed out that among them was a specimen of *Polyommatus phlæas*, which was not a species one would expect to occur at Labrador. Mr. Tutt exhibited photographs of varieties of *Abraxas grossulariata*, *Arctia caia*, *A. villica*, *Spilosoma lubricipeda*, *S. mendica*, &c. Mr. Lewcock, larvæ and perfect insect of *Mesium affine*, Boisd. Mr. Carrington, in his remarks on taking the chair, made some interesting suggestions for the Society's work during the coming season.

February 27th. — The President in the chair. Messrs. W. Smith, of Paisley; W. Bloomfield, of Mildmay Park; and G. A. Farini, of Forest Hill; were elected members. Mr. Bloomfield exhibited two specimens of *Hesperia lineola*, taken in Essex, 1888. Mr. Watson, a nest of a species of *Mantis* with two living examples of the insect; many other specimens had emerged in transit from Sydney, where the species was said to occur freely. Mr. Billups, *Meopus trispinosus*, Wat., from New Zealand; *Poroplectura monstrosa*, Oliv., from Brazil; and read notes relative to his exhibit. Mr. Billups also showed galls collected at West Cliff, Colorado, by Mr. Cockerell, who wrote that the rose-galls were of three species: *Rhodites ignata*, Osten-Sacken, from which an abundance of a parasitic Cynipid, *Perichlustus pirata*, Osten-Sacken, would be bred; *Rhodites fusiformis*, a new species, and the little blister-like galls on the leaves would produce *Rhodites rosafolia*, Cockerell. Of the willow-galls, the reddish fusiform ones pro-

duced *Cecidomyia salicis-silique*, Walsh., the bud-galls *Cecidomyia salicis-strobiloides*, Osten-Sacken. Mr. Cockerell expressed an opinion that from the galls many Chalcids, including some rare species, would be reared, in addition to the gall-makers. An exhibition of microscopical objects was then given by Messrs. Collins, W. West, R. Adkin, T. R. Billups, Cameron and others.

March 13th.—The President in the chair. Messrs. A. E. Peake, of Tooting; and E. W. Sinclair-Cox, were elected members. Mr. Tutt exhibited typical specimens of *Agrotis obelisca*, Hb., from Germany; the variety *hastifera*, Donz., from Hungary; and some picked specimens captured by Mr. A. J. Hodges in the Isle of Wight, of a different type to the var. *hastifera*, but much nearer that than the typical *obelisca*. Mr. R. Adkin, referring to a series of *Mania typica* which he exhibited, said that the larvæ were found last autumn, and were fed up in a warm room. The majority pupated in November, and the imagines emerged in January and February of the present year. He had found a similar method of forcing the larvæ of some species of *Triphæna* equally successful, and he believed that many other Noctuæ whose larvæ hybernated might be similarly treated with good results, provided of course that the larvæ could be induced to take such food as might be obtained during the winter months. Mr. Gerrard exhibited living larvæ and pupæ, with set examples of the imago, of a species of *Ephestia* discovered in some old samples of rice. At present he was unable to say where the moth came from, as the samples of rice were from Japan, Java and Burmah, and these had unfortunately been mixed; he would, however, write to the merchant who had forwarded the samples, and get further information. Mr. Mansbridge exhibited living larvæ and imagines of a Tineæ found feeding in samples of fish-guano, and said that the guano was brought from Brettesnaes, on the N.W. coast of Norway, and was composed of the flesh and bones of small cod and herrings. The larvæ inhabited a tube or gallery which was formed of particles of the food united with silk. In all the examples seen, these galleries were beneath the surface, but before pupating the larva worked its way upwards and pupated just below the surface. Mr. West (Greenwich) exhibited a fine collection of Coleoptera from the Columbian Republic. Mr. Billups, a specimen of *Ichneumon haglundi*, Holmg., a species new to Britain, bred by Mr. R. Adkin, from a larva of *Arctia fuliginosa*, received from Scotland; a series of *Apanteles emarginatus*, Nees., bred from *Gracillaria omisella*, by Mr. Elisha; a specimen of an Hemipteron of the genus *Pentatonia*, taken alive in the Borough Market, from a package of West Indian bananas; a species of Chrysomelidæ, found alive in a barrel of grapes from Malaga; and a live female specimen of *Bombus latreillus*, Kirby, found among lettuce from the South of France.—H. W. BARKER, *Hon. Sec.*

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—*February 20th*, 1890.—J. A. Clark, F.E.S., President, in the chair. Mr. C. B. Smith was elected a member of the Society. Mr. Whittle exhibited three specimens of *S. fagi* from Epping. Mr. J. W. Tutt, the genus *Xanthia*, including a long series of intermediate forms of *X. fulvago*, from perfectly clear to very dark specimens; also a selection of *Agrotis tritici* from Deal, Aberdeen and Valais, exhibiting variation in ground colour from pale whitish-grey to deep-brown and black, and the two marked forms, (a) with pale costa and median nervure, (b) without pale costa. In the

course of his observations Mr. Tutt said, that the latter reticulated form had often been mistaken for *A. cursoria*, and that Newman, in his 'British Moths,' undoubtedly treats it as such, although at the same time he figures the true *cursoria*. The exhibits of Coleoptera were:—Mr. Milton, *Blaps similis*, Latr.; *Necrophorus interruptus*. Mr. Heasler, *Geodephaga*. Mr. Mr. Raine, preserved larvæ of *Tenebrio* and *Ocytus*. Mr. Cripps, *Apionidae*, &c. Mr. A. U. Battley gave an interesting account of the construction of spiders' webs. He differed from those who affirmed that the framework was built first, and demonstrated this by means of a number of models and diagrams taken from webs in actual progress, as witnessed by him during last year. It appeared, from his observations, that the radii were first constructed.

March 6th. — The President in the chair. Mr. Whittle exhibited a series of *M. plagiodactylus*, and a specimen of *B. piniaria* captured in the city; also *D. oo* and *A. nemoralis*. Mr. Battley, dark vars of *H. marginaria*. Mr. Quail, life-histories of *C. ligniperda* and *Z. pyrina*. Mr. Simes, a pair of *E. autumnaria*, taken at Southsea in September last. Mr. J. A. Clark, both sexes of *Blatta americana*, the female with egg-bag attached. Mr. Milton, *T. apiformis* and *N. orion*; also Coleoptera. Mr. E. A. Newbery exhibited two examples of *Amara nitidus*, which he had found in an old collection mixed up with *A. communis*. Mr. Heasler, *Bembidium 4-guttatum*, *Chlenius vestitus*, and *Stenus bipunctatus*. Mr. G. A. Lewcock, a necklace composed of pupa-cases of a species of *Coccus* found in an ant's nest at Cape Colony, received from Mr. P. W. Jarvis. Dr. J. S. Sequeira, a pair of migratory locusts (*Pachytylus migratorius*) picked up on board a vessel in the Mediterranean. — G. A. LEWCOCK, E. HANES, *Hon. Secs.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY. — February 17th, 1890. Mr. W. E. Blatch, President, in the chair. Mr. C. J. Wainwright read a paper on "One day's work in Wyre Forest," in which he described an unusually good day's collecting. Many species were taken, including larvæ of *Endromis versicolor*, many of *Asphalia flavicornis*, and many other good species. He urged on the members to devote special energies to the Forest, which he believed to be the best district, at any rate in the Midlands. Considerable discussion followed, in which Messrs. G. T. Baker, W. E. Blatch and R. C. Bradley joined.

March 3rd.—Mr. W. E. Blatch in the chair. Messrs. H. M. Lee, A. Johnson and R. P. Gilbert were elected members. Mr. A. H. Martineau showed a large exotic *Bombyx*, bred from an evidently imported larva sent from Yorkshire. Mr. W. E. Blatch, showed *Phibalapteryx lapidata* taken at Shap Fell in September last. This he believed to be the first recorded capture in England. Rev. C. F. Thornehill remarked that there appeared to be two forms of *Phigalia pedaria* found near Burton:—one early, large, and well-marked, found in the open country; and one three weeks later, small and not so well-marked, found in the woods. He wished other members to record their experience. Mr. Thornehill then read a paper on the Lepidoptera of Burton-on-Trent, in which he mentioned the most interesting species taken in or near the town. Butterflies were decreasing in number of species. Sphinges were very well represented; Bombyces fairly well, as also the Geometers; but the Noctuæ were not so well.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

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EDITORIAL.

OUR readers will be glad to learn that the Reference Committee of 'The Entomologist' has been augmented by the addition thereto of the eminent entomologist, Mr. HENRY WALTER BATES, F.R.S., F.L.S., F.E.S., &c.

VARIATION OF *AGROTIS TRITICI* AND *A. CURSORIA* FROM LANCASHIRE.

BY RICHARD SOUTH.



Fig. 1.—*Agrotis tritici*, upper and under surfaces.

Fig. 2.—*A. cursoria*, upper and under surfaces.

I AM indebted to Mr. Baxter, of St. Anne's-on-the-Sea, Lancashire, for series of *Agrotis tritici* and *A. cursoria*, showing the range of variation of these species in his district.

The thirty-four examples of *tritici* and forty-five *cursoria* selected have been arranged, according to markings, into thirteen groups. An attempt was made to form colour detachments, but this was abandoned, as it did not promise to lead to any useful result. The colour variation of *tritici* from this district does not appear to be very extensive: a few specimens are grey-brown, others pale reddish brown, and one or two fuliginous brown; but the majority of examples would be best described as dark brown.

Cursoria is more variable in colour, and the aberration exhibited may be tabulated as follows:—

- Grey. — *a.* Whitish grey—leadен grey.
 b. Ochreous grey—brownish grey.
Brown.—*c.* Pale whitish brown—ochreous brown.
 d. Pale reddish brown—dark reddish brown.

Except as regards certain specific characters, to be referred to presently, many forms of *tritici* are almost identical in marking with forms of *cursoria*. In the majority of these parallel instances there is a colour difference, but it is not always so; and although it is quite possible that anyone may readily separate typical *cursoria* from *tritici* by colour alone, it may not always be quite such a facile undertaking to distinguish correctly between certain forms of the two species, unless well acquainted with the specific characters of each species.

The pale transverse lines on the fore wings of *tritici* and *cursoria* are usually bordered by dark lines; but although these are, on the disk of the wing, subject to considerable modification in the direction of complete effacement, they are almost invariably indicated on the costa as spots and dots. For the purpose of comparison, however, it is not necessary for us to concern ourselves with the discal markings, as only those on the costa are of any real use.

Referring to the woodcut above, it will be observed that *tritici* (fig. 1) has a dark bar on the costa between the basal and inner lines of fore wing, whilst in *cursoria* (fig. 2) these lines are each preceded and followed by dark dots, the space between the lines being clear. The under surface of the fore wing also affords good specific characters. *Cursoria* (2) is more or less fuliginous from base to central transverse line, and pale beyond to outer margin; the discal spot is black, and very distinct. *Tritici* is suffused with fuscous on the outer half of wing, and the inner becomes pale towards base; there is a black discal spot, and from the outer edge of this a broad pale ray is projected towards external margin of the wing. These are trustworthy characters, and in ninety-nine cases out of a hundred *tritici* may be distinguished from *cursoria* by reference to the upper surface alone; but if there should be any doubt about the matter, examination of the under surface will solve the difficulty.

As regards ornamentation, the aberration of *tritici* and *cursoria*, from St. Anne's, represents the entire variation of these species, so far as I am acquainted with it. Specimens in my collection, from other localities, are more striking perhaps, but they are only extreme examples of one or other of the varietal groups into which I have divided the Lancashire specimens. As it may present the matter in an intelligible form, I have attempted

to tabulate the variation of transverse and longitudinal markings, as under:—

A.—Transverse lines distinct.

Section I.—Subcostal longitudinal streak more or less well defined.

Group 1.	Streak white.	5	<i>tritici</i> .	1	<i>cursoria</i> .*
„ 2.	„ grey.	3	„	3	„
„ 3.	„ ochreous.	1	„	1	„

Section II.—Subcostal longitudinal streak ill defined.

Group 4.	Streak suffused.	4	<i>tritici</i> .	4	<i>cursoria</i> .
„ 5.	„ represented by a basal dash only. 6	„		4	„

Section III.—Subcostal longitudinal streak absent.

Group 6.	An angulated band-like transverse shade passing between the stigmata.....	3	<i>tritici</i> .	5	<i>cursoria</i> .†
„ 7.	Without band-like shade.	2	„	2	„

B.—Transverse lines evanescent.

Section I.—Subcostal longitudinal streak fairly well defined.

Group 8.	Streak white.	1	<i>tritici</i> .	1	<i>cursoria</i> .
„ 9.	„ ochreous grey.....			2	„

Section II.—Subcostal longitudinal streak ill defined.

Group 10.	Streak suffused.	3	<i>tritici</i> .	4	<i>cursoria</i> .
„ 11.	„ represented by a pale basal dash. 3	„			

Section III.—Subcostal longitudinal streak absent.

Group 12.	Traces of a transverse band-like shade.	1	<i>tritici</i> .	1	<i>cursoria</i> .
„ 13.	No trace of transverse shade.	2	„	2	„

Besides the aberrations adverted to in the foregoing tables, there are several others which it is not possible to group or tabulate in a satisfactory manner; but some reference must be made to variation of the stigmata. In both species the reniform and orbicular stigmata are usually outlined in white, whitish, or pale brown, and filled up with the ground colour. All the examples of *tritici* have the lower fourth of reniform dark, but seldom so black and conspicuous as it is in the majority of the specimens of *cursoria*. The space between the stigmata is generally darker in *tritici* than *cursoria*.

In the last-named species there appears to be greater diversity in the colour of stigmata: two specimens have both reniform and orbicular entirely white; two have these stigmata narrowly outlined in white, and filled up with black; whilst two others, with fairly distinct transverse discal lines, have but the faintest possible trace of any stigmata whatever. Several specimens have the orbicular more or less completely eliminated, and the reni-

* The specimens figured belong to group 1.

† Two specimens of *cursoria* in group 5 have the transverse shade more or less clearly defined.

form represented by the blackish lower fourth only. These last modifications of the stigmata are only observed in the pale coloured specimens; and are generally associated with absence of longitudinal and transverse markings.

The claviform, sometimes not present in either species, is usually outlined in black in *tritici*, and black or brown in *cursoria*. In some specimens of each species it is large and well defined, while in a few it is entirely filled up with black, and only separated from a longitudinal black basal bar by the inner transverse line.

The pale colour on costal area has been referred to in these notes as the subcostal streak, because it appears to be the amplification of a character which exhibits initial development on the subcostal nervure. In some examples of *cursoria* from Unst, the space between subcostal nervure and the costa itself is filled up with white, and in these specimens the specific characters of upper surface are of course hidden.

THE USE AND ABUSE OF THE TRINOMIAL SYSTEM.

By RICHARD SOUTH.

To any who may be inclined to confer varietal names, the numerous forms of *Agrotis tritici* and *A. cursoria* will afford abundant material upon which they can operate with consummate satisfaction to themselves; but as I have yet to learn in what way science in general, and that of Entomology in particular, is advanced by the imposition of distinctive names on certain links in the chain of an insect's variation, I have not ventured to take upon myself the responsibility of adding some fifteen or twenty names to the perplexing list of aberrations we already have.

I am well disposed towards the trinomial system, as suggested by Mr. Cockerell (Entom. xx. 150), but the most ardent supporter of that system must take exception to the wholesale christening of more or less unimportant aberrations. The lepidopterist is well aware that with very many species, especially among the Noctuæ and Geometræ, there is a tendency to deviate either in colour or markings, sometimes both, from a given type. In some of these species aberration is often of a most extensive character. The scheme of variation, however, is, with few exceptions, identical throughout, *i. e.*, there is aberration (a) in colour, (b) modification of markings. As regards colour, departure from a fixed type is exhibited in one of two opposite directions, sometimes both: one graduates in the direction of melanism, the other towards albinism; whilst the ornamentation may be well developed, and consequently conspicuous on the one hand, or evanescent on the other. In a good series which really

represents the range of a species variation, it is rare to find a form that cannot be linked up with the type by intermediate aberrations. Any such exceptions are, perhaps, most likely to occur among the representatives of a species from isolated localities. When dealing, therefore, with the forms of a variable species, it would surely be supererogatory to name all those individuals which deviated more or less from the typical form of that species; but less than this we cannot do, if we essay anything in the way of varietal nomenclature, and desire at the same time to be consistent. Haworth and Stephens, among others of the older entomologists, described and named several forms of *A. tritici* as distinct species, but these have long ago been deposed. It would be interesting if twenty lepidopterists of the present day would select specimens which they considered to agree with the descriptions of—say, for example—*lineolata*, Haw., *albilineata*, Haw., *cuneigera*, Steph., and *ocellina*, Steph., and submit these to some competent authority for adjudication. Such an experiment would be valuable, as it would illustrate individual appreciation of varietal differences, and possibly furnish a startling exposition of the general inutility, from a practical point of view, of endeavouring to permanently fix that which is unstable.

Charæas graminis has been divided up into twelve named forms, and at the same time we are told that there are numbers of intermediate forms. It would seem, then, that anyone desiring to work out the varieties of this species correctly, *i. e.*, according to the oracle, must be a clairvoyant, or he will probably go astray.

The absurdity of variety naming of the hair-splitting order attains its maximum when the nomenclator takes a coloured figure for his type, and dubs as var. *intermedia* a specimen which is not so highly tinted with a particular colour as such figure.

Suppose we have four specimens of a species, which in the matters of colour and markings are fairly constant within certain limits:—A, agrees with the description of the type of the species in every respect. B, however, differs from A, and of course from the type, in having a paler tint, but the markings are identical in both specimens; we therefore name this var. *pallida*. C, has the colour of the type, but the markings are not well defined; so we will call this var. *obsoleta*. D, is rather darker in colour than the type, but the markings are similar to those of C; as this specimen does not agree exactly with either B or C, and as it is still further removed from the type, we must name it also, say, var. *obscura*. So far, well; but someone has a fifth specimen, which in tint is the same as B, but the markings are less clearly defined than in C. This example cannot be referred to *obsoleta*, because that var. has typical coloration; and, although it agrees in tint with var. *pallida*, the markings won't do, as they are far from typical.

So, to make things pleasant all round, this individual would have to be furnished with a name also.

In his 'Code of Varietal Nomenclature,' Mr. Cockerell (*l. c.*) proposes terms expressive of certain kinds of variation common to many species of Lepidoptera, and the adaptation of one or other of these suitable to the occasion would, in the majority of cases, convey as clear an idea of the form referred to as an extended description could do. There is, too, this distinct advantage, that whereas the one refers to a phase of variation, the other singles out a particular individual, and elevates it to the dignity of a type, a distinction which in some cases it certainly does not deserve.* It should be remembered that these third names are really epitomised descriptions; therefore if we wish to inform a friend, or the entomological public at large, that we have taken some specimens of *A. cursoria* in which all the markings are absent, we can do so shortly, by writing *A. cursoria deleta*. In the case of specimens received from foreign localities, with the fauna of which we are not quite familiar, it is not only permissible, but highly desirable, as a check to synonymy, that names should be given to specimens showing any well-defined aberration. These examples might certainly prove, on further examination, to be distinct species; but then no harm would be done, as all that would be necessary would be to state the fact, and their names would go with them in their promotion. At all times, well defined local forms or races of a known species should be named; and, when it can be done, it would be well if such names were framed, with reference to habitat, or, perhaps, better still, to some striking feature exhibited by the form.

CRITICAL NOTES ON DIPTERA.

By G. H. VERRALL, F.E.S.

As to the five species introduced as new to Britain by Mr. Brunetti (Entom. 122), *Psilocephala ardea*, F., is quite properly noticed; the species introduced by B. Cooke as *Thereva fuscipennis*, Mg., in Ent. Mo. Mag. xv. 19 was really *Psilocephala ardea*, F., as I have since ascertained from some of the original specimens in Dr. P. B. Mason's collection. Consequently *Thereva fuscipennis*, Mg., should be erased from my list and *Psilocephala ardea*, F., substituted. *Lasiops semicincta*, W., has nothing to do with the genus *Lasiops*, and is in my list as a *Hyetodesia*; it is very common in the North, while I have taken it as far South as Sussex and Devonshire. I have seventeen localities for it. *Leria ruficauda*, Zett., is probably correct; I

* Possibly this is so with *Heliophobus hispidus* var. *obsoletus* (Entom. xxii. 187).

have a number of specimens taken at Plashett Wood, Sussex, on April 5th, 1870, so labelled, but I have never critically examined the Helomyzidæ. *Heteromyza atricornis*, Mg., does occur in my list, but in a place where nobody would expect it; the species introduced as *Pegomyia rotundicornis*, Zett., is really *Heteromyza atricornis*; I caught the species in abundance near Lairg on June 20th, 1884, but it occurs South, as I had just previously taken it in Sussex, and I think I have it from Devonshire, while Dale's specimens of *Pegomyia rotundicornis* were from Dorsetshire. I was not sufficiently satisfied with its name to include it in my list. *Sapromyza platycephala*, Lw.; as far as I know this species exists only upon two injured specimens described in 1847 from Mehadia in Hungary, upon the borders of Roumania: I should hardly expect this to be common on the windows of a London house in 1889, without having been observed in the intervening 42 years. I have been too busy with my own captures this winter to afford time to name many specimens belonging to other people, or else I expect I should have been able to examine some of the specimens; but even if I had, my critical knowledge of *Sapromyza* is insufficient to enable me to speak with confidence.

Dicranomyia dumetorum, Mg. The common species, London and everywhere else, is *D. chorea*, Mg.

Lonchoptera trilineata, Zett. I have several specimens which I believe to be this species, but having never critically examined the genus, I refrained from adding species; the distinctive characters of the various so-called species are as yet very unsatisfactory.

Ascia dispar, Mg. This may be a good species, but I cannot yet satisfactorily distinguish it from *A. floralis*, Mg.

Microdon devius, L. I have not seen recent specimens of this, but should very much like to do so, as I have seen a beautiful specimen of the other species, *M. mutabilis*, L., caught last year in Devonshire by Major Yerbury.

Conops vitellina, Lw. According to a recent comparison made by Mik between this species and *C. 4-fasciata*, DeG., all our specimens are yellow specimens of the latter; types that I possess point to the same result. *Conops* is feminine, and in this genus, as well as in *Chrysops*, the specific names may well be made feminine.

Theria muscaria, Mg., was brought forward as British in July, 1888, by Dr. R. H. Meade in time for me to include it in my list (Ent. Mo. Mag. xxv. 27); further details were given by Mr. Coryndon Matthews in Ent. Mo. Mag. xxv. 379.

Cynomyia mortuorum, L., was common at Rannoch in June, 1870.

Tephritis matricariæ, Lw. I think it would be better in a

case like this to mention a *Tephritis* sp?, rather than repute a new species to Britain.

Palloptera parallela. Mr. Brunetti gives no author's name to this species, and I cannot trace that it has ever been described; in fact, the name is quite a new one to me.

As to the three species of *Limosina* said to be not mentioned in my list, I may say that *L. pusilla*, Mg. = *L. acutangula*, Zett.; *L. fenestralis*, Fln., is in the list of reputed species; while *L. cilifera*, Rond., is an unsatisfactory Italian species, at present unconfirmed by any subsequent writer.

Now that I am writing I may enumerate a few unrecorded British Diptera, and corrections to my list:—

Cecidomyia alpina, F. Lw. *C. filicina*, Kief (= *C. pteridis*, Müll.). *C. foliorum*, Lw. *C. tubicola*, Kief.

Diplosis betulina, Kief. *D. fraxinella*, Meade.

Schizomyia (Kief) *galiorum*, Kief.

Sciara flavipes, Pz.; confirmed.

Cordyla crassicornis, Mg. To be omitted and added to List of Reputed Species: the ? *crassicornis*, Curt., seems to belong to a new genus near *Anatella*, according to a specimen in Mr. C. W. Dale's collection.

Leia elegans, Winn.; in Mr. C. W. Dale's collection.

Diadocidia ferruginosa, Mg.; confirmed.

Chironomus flexilis, L.; confirmed: near Rydal. *C. nigrimanus*, Stæg.; confirmed. *C. nubeculosus*, Mg.; confirmed. *C. fuscipennis*, Mg.; confirmed. *C. biannulatus*, Stæg.

Tanypus guttipennis, V. d. Wulp; in The Broads. *T. phatta*, Egg.; in myriads at Slapton Lea.

Ceratopogon bipunctatus, L.; confirmed. *C. varius*, Winn.; confirmed: common in my house. *C. femoratus*, F.; confirmed.

We must be very rich in Chironomidæ in England; I possess (after excluding, as far as known, all above 12 specimens of a species) over 2500 specimens, comprising, I believe, at least 270 species, but the ascertaining the correct names is very difficult; for instance, Stæger described, in 1840, a *Chironomus nigrimanus* from Denmark, which he said was very rare in May and June; in 1850 Zetterstedt had never seen this species, but in 1859 he obtained one female, and says Rotts had caught both sexes in the spring at Ringsjon; Van der Wulp described, in 1859, two males caught at The Hague, which he says tolerably, but not thoroughly, agree with Stæger's description; in 1877 he notes that Wttewaall had caught it at Utrecht. These are all the references to the species with which I am acquainted, except Walker's description in Ins. Brit. Dipt. iii. 172, which, according to the table on p. 153, must refer to a very different species. Now, I have had under my eyes forty or fifty males of one species, probably that

taken by Van der Wulp, and I possess six males of a closely-allied species, seven males of another which would pass under Stæger's description, one male of a fourth species, and two large males of a fifth species with dark tibiæ, besides females of several species. Who can say which of my five species is *Chironomus nigrimanus*, Stæg., and what species were represented in the stragglers previously recorded?

Limnobia stigma, Mg.; common in North Wales.

Dicranomyia ornata, Mg.; in Rev. T. A. Marshall's collection.

Atherix unicolor, Curt. = *Ptiolina wodzickii*, Frfld. I will not at present discuss the priority of name.

Rhamphomyia dispar, Curt. = *Ocydromia glabricula*, Fln.!

Edalea stigmatica is a misprint for *stigmatella*.

Clinocera barbatula. Instead of "Hal." put "Mik."

Tachydromia stramineipes, Zett., is only a variety of *T. pectoralis*, Fln. I caught a long series last August in Tilgate Forest showing every gradation.

Psilopus obscurus, Mg., is probably a synonym of *P. longulus*, Fln.

Neurigona pallida, Fln.; confirmed. *N. suturalis*, Fln.; confirmed. *N. Erichsonii*, Zett.; relegated to "Reputed Species."

Gymnopternus parvilamellatus, Mcq., is a *Hercostomus*.

Chrysotus angulicornis, Kow.

Argyra atriceps, Lw.

Sympycnus nigritibialis, Zett. = *S. æneicoxa*, Mg. *S. bifasciellus*, Zett. = *Lamprochromus elegans*, Mg.

Platypeza modesta, Zett., and *P. rufa*, Mg. Quite correctly introduced in Mr. C. W. Dale's 'History of Glanvilles Wootton.'

Chalarus holosericeus, Mg., is only the other sex of *C. spurius*, Fln.

Pipizella biguttata, Curt. = *P. flavitarsis*, Mg.

Chilosia mutabilis, Fln.; confirmed.

Rhingia campestris, Mg. I am now convinced that there are more than one species of *Rhingia* in Europe, and that our common species is *R. campestris*, Mg. I am not yet satisfied that *R. rostrata*, L., also occurs here, although I expect it does.

ANTHOMYIDÆ. The four subfamilies I have indicated are distinguished as follows:—

MYDÆINÆ: Dorso-central bristles 2 in front of suture, 3, or more commonly 4, behind suture; anal and axillary veins both straight and abbreviated; eyes often hairy. Usually large, stoutly-built species, with plumose arista and frequently spotted abdomen.

ANTHOMYINÆ: Dorso-central bristles 2 in front of suture, 3 behind; anal vein extended (though faintly) to margin; eyes very seldom hairy; abdomen never with the characteristic "*Limnophora*" spots, and never stout and rounded, but more elongate.

HOMALOMYINÆ: Dorso-central bristles 2 in front of suture, 3 behind; *anal vein short, axillary curved and continued beyond end of anal*; arista nearly always almost bare; eyes bare. Small or rather small species; abdomen shortish, broad, flat, and with characteristic triangular dorsal spots or modifications thereof.

CÆNOSINÆ: *Dorso-central bristles 1 in front of suture*, 3 behind; anal and axillary veins straight and abbreviated; eyes of male never nearly touching, always bare; abdomen tubular, usually spotted.

In January, 1888, Mik called my attention to a distinction in the claws of Mydæinæ and Homalomyinæ.

Polietes hirticrura, Meade; confirmed: Kilmarnock.

I need not repeat Meade's additions, unless by way of criticism, as he has been kind enough to send me nearly all for examination.

Limnophora albifrons, Rond.; the specimen was *Hydrophoria socia*, Fln., ♀.

Hydrotæa parva, Meade; I think this is *H. glabricula*, Fln., which was previously reputed.

Pegomyia hyoscyami, Pz., and *Winthemi*, Mg., may be erased, the exponents being very unsatisfactory.

Homalomyia triangulifera, Meade (nec Rond.), is *H. lepida*, W., which by some extraordinary chance I omitted from my list, but noticed the omission just in time to include it among the reputed. *H. nigrisquama*, Meade; confirmed.

Cænosiæa scrupulosa, Zett.; the specimens belong to *Spilogaster*, as at present constituted. *C. pictipennis*, Lw.; Meigen's name of *costata* is more generally accepted, even though he mistakenly called it a *Sapromyza*.

Pteropæcila lamed, Schrk. In including this species in my list I fell into the same error into which Haliday had fallen more than fifty years before. Our British species is the little-known *Toxoneura muliebris*, Harr. (*fasciata*, Mcq.). Consequently *P. lamed* should be excised from my list, and *T. muliebris* added from the reputed list and placed next to *Palloptera* under the Lonchæidæ.

Oscinis rapta, Hal.; this should be added to the British species, and *O. rapta*, Mcq., excluded from the reputed species.

These are a few notes upon species concerning which I have arrived at some definite conclusion; but there are hundreds of others upon which I am in doubt. When I published my list I thought I fairly understood the genus *Tanytus* with 19 species; I now think I possess 40 species. In *Simulium* I admitted two species; I now think I possess about ten species. A vast amount of work remains yet to be done, but it had better be done with caution.

Sussex Lodge, Newmarket.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. PERRY COSTE, F.C.S.

II. — A PRIORI ANTICIPATIONS.

It will perhaps conduce to clearness if I now quote briefly a few extracts from the notes that I drew up for my own guidance before commencing these experiments. They are not without a moral—seen in the light of later and experimental knowledge; and, anyhow, my readers will thus be travelling along the same route that I myself pursued.

Now the results that I anticipated were to have a twofold significance, *viz.*, from the phylogenetic and the chemical standpoints. *Phylogenetically*, I anticipated finding illustrations of the evolutionary doctrine of the origin of species, and of the various *stages* represented by each species in a natural group or genus,—at least so far as regards colouring,—just similarly, for instance, as Weissmann found in the markings of *Sphinx* larvæ.* Furthermore, I expected to obtain two wholly different lines of results with these colours, according to the nature of the reagents used. I anticipated obtaining (a) *progressive*, and (b) *retrogressive*, modifications; and it also seemed possible that by such results some light might be thrown on classification. And, lastly, similar *markings* in different colours on allied species might be expected to yield a common colour (either progressively or retrogressively) under the influence of the same reagent.

Chemically, I hoped to compile a table of the colours in their biological rank, and noted it as very interesting, when the apparently same colour occurred in different groups, to determine whether it would be affected in the same way (*cf.*, for instance, the yellow of the under wing in the *Triphænæ* and in *Heliaca arbuti*). Only after writing the above did I recollect that Grant Allen (reasoning, however, not from the results of experiments, but from observation alone) had drawn up a table of colours, in their biological rank, for flowers; and it struck me as very interesting to see how far my results might accord with his. I expected that in insects yellow would be found *above* white (*not below*, as in flowers), and *below* red. But what of black (probably above all these), blue, brown, &c.? *That* remained for experiment to show.

Nevertheless, I wrote,—very likely a *linear* arrangement of *all* the colours may be impossible; for as to the ranks of colours, I doubt if there be a universal unity; but rather suspect that a colour may rank below a second colour in one group, and above it in another. I imagine this to be the case from a consideration of the distribution of colour on various insects; broadly speaking,

* 'Essays in Descent' (Meldola's translation), I., 223, &c.

I take it that the ground colour of a wing is the lowest in rank, and primal, whilst bands and markings on it show more highly evolved colours. If so, in *Pieris* and *Colias*, black is above white and yellow; but in *Vanessa atalanta*, below white and red; and so on. This were certainly to assume that the rank of the colours corresponds with their historical order of development. It remains to be seen whether this be a legitimate assumption. Moreover, as regarding the identity of *ground* and *primal* colour, one must remember that a high colour may commence as a band, and end by covering nearly the whole wing, in which case the original ground colour would eventually appear secondary; hence arises a necessity for caution in making such assumptions.

[In view of the experimental results afterwards obtained, I may be permitted to point out that I had thus foretold beforehand the priority of white to yellow (antithetically to Mr. Cockerell's views); and of yellow to red, in order of development. On the other hand, it will appear how utterly fallacious were all my *à priori* speculations on the rank and behaviour of *black*; and also, I fear, on the relations of band and spot colours to ground colour.]

Now, as to *progressive* modifications, I prophesied by far the most interesting and vitally important results from the use of such reagents as the organic acids. For my reagents I divided into two main classes:—1st, those that are naturally present in the insect itself, or in the plants that it feeds upon; and 2nd, those altogether foreign to the insect and plant. In the first class were included such reagents as formic, acetic, malic, citric, succinic, oxalic, benzoic, and tartaric acids, &c.; also, by an extension, such oxidising reagents as potassic permanganate, seeing that oxidation perhaps plays an important part in the evolution of colours; although an objection might of course lie here against such reagents on account of possible chemical action other than oxidation. In the second class I included all such reagents as strong mineral acids (sulphuric, nitric, hydrochloric, &c.); strong alkalis,—ammonia, sodic hydrate, potassic hydrate; and any salts that might be tried, as, *e.g.*, potassic ferro-cyanide, potassic iodide, argentic nitrate, &c. Evidently none of these could affect the insects in nature,—they are all foreign reagents; therefore I considered that no *progressive* modifications could be looked for from the use of these reagents, but merely *retrogressive*; for it seemed likely that by destroying the present colourings they would reveal the earlier stages. Subsequently, however, I noted that possibly these *progressive* and *retrogressive* reagents were too sharply divided, since “unnatural” reagents *might* produce the *progressive* modifications in experimenting, although in nature such modifications have been brought about by other means.

Now regarding this progressive modification of colour,—although carefully guarding myself against expecting too much, or admitting so sweeping an anticipation as that of producing artificially *all the* stages in coloric development displayed in nature, seeing that such are probably due to the action of more causes than simply the metabolism of the insect; due, for instance, to variations of temperature, atmospheric and climatic conditions generally,—*yet* I considered that by the external application of such already mentioned organic reagents, as in very small and dilute quantities are present in the insects themselves, I might produce progressive modifications of colour similar to those that have occurred already in many species. I hoped thus to complete changes already commenced in an insect itself, or displayed by closely allied species: for instance, to change the *white* of *Pieris* into the black, already present as spots and tip markings; the white of *Euchloë cardamines* into orange, like the tip; the pale yellow of *Colias hyale* into the deep yellow of *Edusa*; these yellows into black, like the borders; and the yellow of *Gonepteryx rhamni* into the red of *G. cleopatra*. Especially, too, in those species where the males are brilliantly coloured and the females dull, did I anticipate being able to change the female tint into the male (cf., *Lycænæ*, *Euchloë*, &c.).* How utterly fallacious and doomed to disappointment were all these anticipations, will subsequently appear.

Then as to the *retrogressive* modifications,—here, at any rate, the event proves me to have been on somewhat safer ground in my predictions. I have already explained that I expected to find such reagents as the strong mineral acids and the caustic alkalis convert the latest evolved colours backwards to a lower colour, thus giving me the original (*sic*) type colours; and this both as regards the several colours of one species, and the range of colours in a genus of many species. These results would form, therefore, an exact counterpart to those that I fallaciously hoped for in progressive modification. For instance, in *Pieris* I expected to turn all the black into white; in *Euchloë cardamines*, the orange back to white; in *Gonepteryx rhamni*, the red spots to yellow; and in *Vanessa atalanta*, the red into the ground colour, black.

Supposing these anticipations to be fulfilled, the question next occurred to me whether it might be possible by diluting a given reagent, or by taking a less strong one, to retrace retrogressively the colour evolution step by step. For example,—I thought,—a powerful acid may turn *Colias* all white at once; but it would be far more interesting if (by using weaker acid) one

* In this way, too, I hoped to throw some light on various isolated observations regarding the effect of change of diet in producing coloric variation: as, *e. g.*, that *Arctia caia* is far darker when the larvæ are fed on walnut leaves.

could first turn its black into yellow, and then the yellow to white; although, I should add, that in this particular case I fancied the black had never come through yellow at all, but direct from the *Pieris* black, and that from white; but, at any rate, in such an instance as that of *G. cleopatra* and *G. rhamni*, I hoped to reduce the red flush and spots, respectively displayed by them, to the ground yellow, and then this yellow to the type colour of the genus, as shown by the lowest forms. Again, in species displaying so many colours as the *Vanessæ* do, it would be most interesting to find the lineal order of these, although, no doubt, some would be collateral, and not all unilineal.

Then, again, regarding the statement I have already quoted (p. 155, above), that the *same markings differently coloured* in allied species might be expected to yield a common colour on treatment with retrogressive reagents, it appeared to me that a crucial instance would be afforded by the species of *Catocala*, e.g., *nupta* and *fraxini*. Was the blue of *fraxini*, I asked, evolved *viâ* the red of *nupta* (or *vice versâ*), or are not these two colours more probably collaterally divergent? In the first case one might expect this result:—*fraxini*, blue reduces to red: this to “ χ ” *nupta*, red reduces to “ χ ”; but in the second case, both the blue of *fraxini* and the red of *nupta* might be reduced by a common reagent (or by different reagents) to a common colour. An analogous instance to that of these *Catocalæ* is afforded by the two species, *Euchloë cardamines* and *E. eupheno*, in which latter the ground colour is bright yellow, and the tip orange. By thus applying this principle to all genera that display the same markings in different colours, I hoped to discover the actual order of coloric evolution in each species, and the genetic relationship to all the others.

Such were my expectations as regards retrogressive reagents. It will appear that they have been only partly realised, since I have not succeeded in destroying highly evolved colours, step by step, but have never obtained more than *one* retrogressive change.

That the above-stated opinions may be viewed in their proper light, I must again remind my readers that I have simply been quoting to them from notes written out *before I had made a single experiment*. I trust that I have not been unduly prolix in so doing, but it seemed to me that greater coherence and unity would thus be given to my paper than could obtain, did I omit all reference to my previous anticipations, and plunge directly into the experimental results. Moreover, the speculations I had indulged in of obtaining those *progressive* modifications appear to me to carry a moral and a warning, only illustrating once more the utter futility of relying on any *à priori* hypothetical views,—however probable they may seem,—without subjecting them to the test of experiment. Hypotheses certainly are

indispensable; no coherent line of work can be pursued without them; and to grope blindly through a number of disconnected experiments without any clear notion of what we expect to find, or what we are looking for, is to work wastefully, half-uselessly, and stupidly. But hypotheses are valuable only as schemes of working, and utterly illusory without actual verification. Without further comment, however, we will now proceed to consider the actual experiments, and their results.

(To be continued.)

DESCRIPTIONS OF SOME NEW SPECIES OF CHINESE RHYNCHOTA.

By W. L. DISTANT.

I PREVIOUSLY described (*ante*, p. 90) three new species of Cicadidæ, contained in a small collection, placed in my hands by Mr. J. H. Leech. The following descriptions refer to other novelties from the same source, and we may confidently anticipate considerable accession to the number of known species of the order, when the Chinese insect fauna is more available for study.

HETEROPTERA.

Fam. PENTATOMIDÆ.

Subfam. ASOPINÆ.

NEOGLYPUS OPULENTUS, n. sp.

Ochraceous, thickly covered with dark punctures, and more or less shaded with metallic green; connexivum ochraceous, with a black spot on each side of the segmental sutures. Body beneath and legs pale ochraceous, some small sternal discal spots and the stigmata black. Antennæ dark ochraceous, with the apical halves of the third, fourth, and fifth joints black; joints (excluding basal) almost subequal in length. Head with the lateral margins distinctly recurved; pronotal angles strongly produced into obtuse spines, straight, and directed outwardly. Pronotum and scutellum very coarsely punctate. Corium finely punctate. Long., 20 mm. Exp. pronot. angl., $11\frac{1}{2}$ mm.

Hab. Chang Yang. (Pratt.)

Allied to the only other described species of the genus, *N. viridicatus*, Dist., from Japan, but differing by the obtuse pronotal angles, &c.

Subfam. PENTATOMINÆ.

TROPICORIS ILLUMINATUS, n. sp.

Very dark purplish brown, with the following yellow markings:—A short oblique fascia on each anterior lateral area of the pronotum, and a small central spot on disk of same, the apex of the scutellum, a spot in each lateral angle, and a central longitudinal fascia to same. Connexivum ochraceous, with large blackish spots. Body beneath ochraceous; some central sternal spots, the under side of pronotal angles, stigmata, and a

series of large marginal spots blackish. Legs dark ochraceous, tibiæ with a central pale annulation, tarsi pale luteous, with their apices pitchy; rostrum blackish, with the base paler. Antennæ blackish, with the fourth joint longest. Pronotum thickly and coarsely punctate, with the lateral angles strongly produced, their anterior margins rounded and serrated, their extreme apices terminating in a short obtuse spine. Scutellum coarsely punctate. Corium thickly and finely punctate. Rostrum long, and reaching the penultimate segment of the abdomen. Long., 16 mm. Exp. pronot. angl., 10 mm.

Hab. Chang Yang. (Pratt.)

This forms, with *T. davidi*, Sign., and *T. armandi*, Fallon, a third Chinese species of the genus.

HOMOPTERA.

Fam. FULGORIDÆ.

Subfam. TESSARATOMINÆ.

EUSTHENES PRATTI, n. sp.

Body above dark chocolate-brown; lateral and anterior margins of pronotum and the connexivum dark olivaceous green; head and scutellum more or less suffused with the same colour; membrane bronzy brown. Body beneath rather paler in hue; lateral areas of the sternum, and an abdominal stigmatal fascia, bright olivaceous green; coxæ and tarsi brownish ochreous. Antennæ with the first, second, and third joints blackish; fourth joint ochraceous, with the base narrowly blackish; second joint much longer than the third, and subequal in length to the fourth. Posterior femora in the male with a long spine beneath at base, and two shorter spines at apex. Long., ♂, 28 mm. Exp. pronot. angl., 13 mm.

Hab. Kiukiang and Chang Yang. (Pratt.)

This species is allied to *E. antennatus*, Dist.,* by its elongate body and pale apical joint of the antennæ, but in *E. pratti* this joint is black at the base, and the second joint is much longer than the third; the scutellum is also strongly transversely rugose, and its apex is broadly foveate. The colour is described from a *dry* specimen; when alive, the colour is bright greenish, as with other species of the genus.

Subfam. EURYBRACHYDINÆ.

FRUTIS SINENSIS, n. sp.

Head and thorax above and beneath dull ochraceous; abdomen bright sanguineous, with the anal appendage ochraceous; legs ochraceous, tibiæ and tarsi fuscous. Tegmina dull ochraceous, and with a curved transverse impressed fascia of the same colour near apex. Wings very pale ochraceous, more or less suffused with creamy white. Long. excl. tegm., 20 mm. Exp. tegm., 53 mm.

Hab. North China. (From coll. Leech.)

* From N. E. India. By a misprint, the dimensions of this species were given as "Long., 35 to 36 mm.," instead of 25 to 26 mm. (Trans. Ent. Soc. Lond., 1887, p. 357).

DESCRIPTIONS OF NEW SPECIES OF PHYTOPHAGOUS
COLEOPTERA RECEIVED BY MR. J. H. LEECH, FROM
CHANG-YANG, CHINA.

BY MARTIN JACOBY, F.E.S.

(Continued from p. 118.)

APHTHONA VARIPES, n. sp.

Below and the posterior femora piceous; above metallic blue; antennæ and the four anterior legs fulvous; thorax scarcely visibly (or finely) punctured; elytra distinctly and closely semi-punctate-striate. Length, $\frac{3}{4}$ line.

Head impunctate, the frontal elevations narrowly oblique, like the carina, distinctly raised; antennæ scarcely extending to half the length of the body, fulvous, or with the terminal joints slightly darker, the second joint thickened, the third and fourth more elongate, nearly equal; thorax about one-half broader than long, the sides nearly straight, the anterior angles slightly thickened, the surface sparingly impressed with minute punctures; scutellum black; elytra rather strongly and closely punctured, the punctures arranged in somewhat regular rows, the posterior portion more obsoletely punctate.

Very closely allied to *A. Bonvouloiri*, Allard, from Syria, but narrower and rather smaller, the antennæ and legs less robust, and the elytral punctuation much closer and finer; from *A. modesta*, Weise, distinguished by the differently coloured legs, and the scarcely perceptible punctuation of the thorax; from *A. trivialis*, Weise, by the colour of the under side and that of the antennæ. *A. chinensis*, Baly, differs by the colour of the antennæ, the nearly quadrate thorax, and its larger size.

Many specimens.

LUPEROCNEMUS, Fairm.

This genus was described by Fairmaire in the Belgian Annals of 1888. The author has said nothing about the state of the anterior coxal cavities, nor given the length of the posterior tarsi, consequently it is impossible to come to a conclusion in regard to the systematic position of the genus. There are, however, two specimens contained in this collection, which answer entirely the description of Fairmaire's *L. xanthoderus*, and I consequently refer these insects to this species; the anterior coxal cavities are open, and the posterior tibiæ have a distinct spine (Fairmaire describes them as unarmed); the first joint of the posterior tarsi is as long as the two following joints together. In spite of the distinctly incrassate posterior femora mentioned by the author, Fairmaire places his genus amongst the *Galerucinae*, which would put an end to all classification as far as the *Halticinae* are concerned, since this development of the posterior femora is the principal character by which this family may be separated from the *Galerucinae*; whether the insects have saltatorial powers or

not cannot affect their systematic position, consequently *Luperocnemus* must be placed in the *Halticinae*, probably near *Sutrea*, Baly.

HESPERA SERICEA, *Weise* (Pl. I. fig. 11).

This genus, the type of which has quite the appearance of a species of *Luperodes* is much distinguished by the fine pubescence which covers the entire upper surface as well as by the shape of the thorax and the comparatively slender legs. I may add to the description of the author, that the space separating the basal lobe of the prosternum from the thoracic basal margin is so small as to be scarcely perceptible, so that the anterior coxal cavities may almost be considered closed; in most of the specimens obtained by Mr. Pratt, which agree otherwise with the author's description, the first three joints of the antennæ and the base of the anterior femoræ are fulvous.

CREPIDODERA OBSCURITARSIS (?), *Motsch.*

The short description of the author agrees sufficiently with the specimens obtained at Chang Yang to refer them to this species. The insect is of a reddish-fulvous colour, with the terminal eight joints of the antennæ, the apex of the posterior femoræ and the tarsi fuscous or nearly black; the antennæ have their third and fourth joints equal; the thorax is nearly twice as broad as long, the sides are rounded before the middle, and the anterior angles are oblique and thickened, the surface is transversely convex with a few extremely fine punctures, but the deep transverse sulcation is much more distinctly punctured and bounded at the sides by a deep longitudinal groove. The elytra are finely punctate-striate, the striæ themselves rather sinuate and very indistinct near the apex, the interstices are not visibly punctured (which does not agree with Motschulsky's description); the under side and legs are finely covered with greyish pubescence. Apparently rather common.

CHALCOIDES PICIPES ?, *Weise.*

I refer the specimens contained in this collection to this species, although I do not quite see the differences between it and *C. chloris*, Foudr. I referred to the latter species specimens obtained by Mr. Lewis at Japan, and do not find any perceptible difference in the Chinese specimens, which are variable in regard to sculpture and colour. *Weise* compares *C. picipes* to *C. aurata*, Marsh, from which it is no doubt distinct, but his description of *C. chloris* is almost identical with *C. picipes* (both have the first four joints of the antennæ and other characters in common), and but little reliance can be placed on slight variations in sculpture and colour, as our European varieties show.

NONARTHRA NIGRICEPS, *Weise* (Pl. II. fig. 1).

Weise has described this species from a form in which the elytra are entirely pale testaceous and which I look upon as a variety. Amongst the very numerous specimens contained in this collection three forms may be distinguished: (1), elytra with a spot on the shoulder, the apex and a transverse band below the middle, black; (2), elytra with the humeral spot wanting; (3), elytra entirely testaceous or with a narrow posterior dark lateral and sutural margin; all other characters agree with the description of the author.

Many specimens.

LUPERODES BIPARTITUS, n. sp. (Pl. II. fig. 8).

Flavous; the head, antennæ, tibiæ and tarsi, black; thorax transversely sulcate, black, the base fulvous. Elytra finely punctured, the basal half fulvous, the rest flavous. Length, $1\frac{1}{2}$ —2 lines.

Head impunctate, shining, black, the frontal elevations ill-defined, clypeus triangularly thickened, antennæ extending beyond half the length of the body, black, the lower three joints piceous, the fourth joint double the length of the third; thorax transverse, rather more than twice as broad as long, the sides slightly narrowed at the base, narrowly margined, the anterior angles thickened but not produced, the surface with a very distinct transverse sulcation, extending nearly to the sides, the anterior portion with a few minute punctures, black, the basal portion fulvous; scutellum triangular, smooth, fulvous; elytra scarcely narrowed posteriorly, very finely and moderately closely punctured, the interstices slightly rugose here and there and furnished with a few short pale hairs, the basal portion fulvous, this colour changing gradually to flavous towards the middle of the elytra, their epipleuræ extending nearly to the apex; under side and the femora flavous: the first joint of the posterior tarsi as long as half the tibiæ, the latter with a distinct spine; anterior coxal cavities open.

The rather peculiar coloration of this species distinguishes it from any of its allies.

Many specimens.

LUPERODES PRÆUSTUS, *Motsch.*

There is no doubt that this species is the male insect of *Luperodes nigripennis*, *Motsch.*, which has already been remarked by *Weise*. Numerous specimens of both forms have been obtained at Chang-Yang, amongst which are some slightly intermediate in regard to coloration. All the specimens of *L. præustus*, however, are males, which may be known not only by their different elytral colour, but by a small but distinct depression placed at the suture below the scutellum, which is never present in the female (*L. nigripennis*); the last abdominal segment in the male has also an incision at each side. *L. præustus* is also found at Japan. From that locality I have, however, two female specimens, which have the coloration of the male (although not differing in any other way); thus proving that the elytral colour is not always to be relied on in determining the sexes of this *Luperodes*.

LUPERUS PRATTI, n. sp.

Black; the lower portion of the head, the base of the antennæ and the legs, flavous; head and thorax impunctate; elytra scarcely perceptibly punctured. Length, $1\frac{1}{2}$ line.

Head entirely impunctate, shining, black, the lower portion obscure flavous or testaceous (sometimes piceous), the frontal tubercles strongly raised and broad in shape, the carina short; antennæ stout and rather short, about half the length of the body, the three or four lower joints flavous, the rest black, the third joint scarcely longer than the second one; thorax about one-half broader than long, the sides scarcely rounded, straight near the base, the angles obsolete, the surface entirely impunctate; elytra extremely finely punctured, the punctures only visible with a very strong lens, the interstices smooth, here and there furnished with single erect hairs; under side black; legs flavous, the base of the femora sometimes darker, the first joint of the posterior tarsi not longer than the two following joints together; the tibiæ with a small spine.

The pale lower portion of the face, the entirely impunctate thorax, and the extremely finely punctured elytra separate *L. pratti* from several European species with a similar black upper and under surface and pale legs. Amongst the rather numerous specimens obtained a variety is present in which the lower portion of the face and the legs are partly piceous, and it is possible that specimens may be found in which these parts are entirely black. The present species cannot be confounded with *L. capito*, Weise, on account of the black elytra and abdomen.

LUPERUS HIRSUTUS. (Pl. II., fig. 9.)

This species, described by myself from Japan (Proc. Zool. Soc., 1885, p. 742), was obtained numerously at Chang-Yang.

LUPERUS ÆNESCENS?, Weise.

I refer very doubtfully a small *Luperus* to Weise's species. This and several others, lately described by this author, are so closely allied to *L. flaviventris*, Motsch., that it is almost impossible to determine these similarly coloured species without a comparison of the types, especially as varieties in regard to punctuation and even shape have been described by the same author. The present insect is of metallic-green colour above, the abdomen being (as in several others of its congeners) flavous. Weise describes, however, the punctuation of the thorax in nearly all of his species as obsolete ("verloschen"); in the insect before me the thorax is closely and distinctly punctured, the punctures being of different sizes; the elytra also are very distinctly and closely punctate, with the interstices slightly rugose; the shape of the thorax in this and most of the allied species is subject to variation, according to the sexes; in the male it is scarcely broader than long, in the female it is distinctly broader; the antennæ also vary in length, according to the sexes, and this variation prevents a certain determination, when

so many closely-allied forms are concerned. The length of the present species is $1\frac{1}{2}$ line.

LUPERUS CAPITO, Weise.

Var. The head (the vertex excepted), thorax, and elytra and legs, testaceous.

Of this very variable little species, Weise has described four varieties. A fifth is contained in this collection, together with the typical form. In this variety the entire insect, with the exception of the apical joints of the antennæ and the vertex of the head, is flavous or testaceous; some specimens, showing traces of the metallic blue colour of the elytra in the type, are also before me. The description of the author agrees with my specimens, with one exception, in regard to the anterior margin of the thorax, which is described as being strongly concave; in the specimens from Chang-Yang, the same margin is nearly straight. Apparently common.

LUPERUS BIPLAGIATUS, n. sp. (Tab. II., fig. 10.)

Flavous; thorax transverse, minutely punctured; elytra very finely punctured in rows, each with a black or piceous spot near the apex. Length, 1 line.

Head with a few very fine punctures at the vertex, deeply transversely grooved between the eyes; frontal elevations transverse, strongly raised; antennæ more than half the length of the body, flavous, the terminal joints slightly darker and thicker, the third and fourth joints nearly equal, elongate; thorax transverse, twice as broad as long, the sides slightly rounded at the middle, the angles slightly thickened, but not produced, the surface very finely and not closely punctured, with two or three very obsolete small depressions, flavous; elytra closely and more distinctly (though finely) punctured than the thorax, flavous, each with a piceous ovate spot near the apex; under side and legs flavous, the tibiæ with a very small spine; the first joint of the posterior tarsi as long as the three following joints together; claws appendiculate; anterior coxal cavities open.

This small species, although possessing the structural characters of *Luperus*, differs from the more typical species of that genus in the transversely-shaped thorax and the small tibial spines; its size and coloration will distinguish it from its allies. Numerous specimens were obtained.

GALERUCA (ADIMONIA) GRISFO-VILLOSA, n. sp.

Ovate, widened behind, dark fuscous or piceous; above obscure testaceous, finely pubescent; head finely, thorax strongly, punctured, the sides subangulate; elytra very closely punctured without costæ, clothed with greyish long pubescence. Length, $2\frac{1}{2}$ —3 lines.

Head rather broader than long, finely rugose-punctate throughout; the clypeus with a distinct longitudinal ridge, extending upwards between the antennæ; palpi but slightly incrassate, the terminal joint acutely pointed; antennæ filiform, extending to half the length of the elytra, black, the basal joint testaceous below, the second one slightly shorter than any of the following joints; thorax transverse, about twice and a half as broad as long, the sides distinctly emarginate below the middle, the upper portion forming

a rounded angle, the posterior margin sinuate near the posterior angles, the surface with a shallow lateral and a more distinct longitudinal central depression, closely and somewhat rugosely punctured, the punctures larger at the sides than at the middle of the disc; scutellum broad, finely punctured; elytra punctured like the middle portion of the thorax, and sparingly clothed with long greyish white hairs; legs and under side more or less fuscous, the femora sometimes dark fulvous at the base; the tibiæ unarmed; the first joint of the posterior tarsi as long as the two following ones together; claws bifid; anterior coxal cavities closed.

In the shape of its thorax, the present species resembles somewhat *G. tanacetii*, but its much smaller size, the absence of any elytral costæ, and the apparently unarmed tibiæ (even when seen with a powerful lens), will distinguish *G. griseo-villosa*.

Four specimens.

GALERUCA CHINENSIS, n. sp.

Ovate, convex, rufous; the antennæ, scutellum, and the apex of the femora and the tibiæ and the tarsi, black; thorax and elytra finely rugose-punctate, clothed with short yellow pubescence. Length, 2 lines.

Var. Legs entirely black.

Head finely rugose, opaque, the clypeus raised into a strong triangular ridge, labrum partly black, palpi rather slender; antennæ rather stout, scarcely extending to half the length of the body, the lower two joints shining, stained more or less with fulvous below, the others black, opaque, the third joint the longest (except the first), the following nearly equal and shorter; thorax more than twice as broad as long, the sides strongly rounded at the middle, the angles in shape of a small tubercle, the surface with a shallow depression at the sides, and a deeper longitudinal groove at the middle, closely and rather finely rugose-punctate, and sparingly clothed with very short yellow pubescence; scutellum black, finely punctured; elytra sculptured and pubescent, like the thorax; posterior tibiæ with a small spine; the first joint of the posterior tarsi scarcely longer than the second one; claws bifid.

In shape and colour this species resembles greatly *G. rufa*, Germ., and several North American forms, from all of which it is separated by the finely, not coarsely, rugose thorax and elytra, and the colour of the scutellum and legs.

Three specimens.

CNEORANE APICICORNIS, n. sp.

Fulvous; antennæ (the terminal joints excepted), the mesosternum and abdomen, the tibiæ and the posterior legs, blackish blue; elytra closely semi-rugose punctate, violaceous. Length, 3 lines.

I am obliged to describe this species as new, since it does not agree with any of the rather numerous and closely allied forms of which it may possibly be a variety. It will be sufficient to point out its principal distinctive characters. There are only about four species with which *C. apicicornis* can be compared, on account of the dark colour of the posterior legs and anterior tibiæ; these are *C. elegans*, Baly, *C. rufo-cerulea*, Fairm., *C. intermedia*, Fairm., and *C. femoralis*, Jac. From these and all others (*C. fulvicollis*, Baly, excepted, which has also fulvous terminal joints of the antennæ, which are, however, incrassate in

the male) *C. apicicornis* differs in the (generally) three fulvous apical joints of the antennæ (in some specimens the apical one only is of that colour). It is a much smaller insect than *C. femoralis*, Jac., and the elytra are much more shining, less strongly rugose-punctate, and violaceous instead of blue. *C. rufocærulea*, Fairm., is described as being smaller than *C. elegans*, Baly ($4\frac{1}{2}$ to 5 mill.), which is one of the smallest species; all others differ in the colour of the breast, and partly of the legs. The thorax in the present species is broader than long, the sides are rather strongly rounded at the middle, and the surface is not visibly punctured; the antennæ, which are longer than half the length of the body, have the three basal joints more or less fulvous below.

More than twenty specimens which were obtained agree in the above particulars.

CNEORANE ABDOMINALIS, n. sp.

Dark violaceous blue; the antennæ black; thorax extremely finely punctured; elytra distinctly punctate; abdomen fulvous. Length, 2—2½ lines.

Head impunctate, the frontal tubercles narrow, oblique; carina acutely raised; palpi slender, piceous; antennæ filiform, black, more than half the length of the body, the third joint one-half longer than the second, but shorter than the fourth; thorax scarcely broader than long, the sides widened at the middle, the anterior angles slightly thickened, but scarcely produced, the surface with a few very minute punctures, only visible with a powerful lens; scutellum broad, black, impunctate; elytra nearly parallel, very finely, closely, and irregularly punctured; tibiæ unarmed; the first joint of the posterior tarsi as long as the two following joints together; claws appendiculate; anterior coxal cavities closed.

C. abdominalis, which may be known from any of its congeners by its uniformly dark blue colour and the flavous abdomen, possesses all the structural characters of *Cneorane*. It greatly resembles *Luperus flaviventris*, Motsch., in coloration, but is at once distinguished from that species by the unarmed tibiæ and other structural differences.

Half a dozen specimens.

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

CHEMISTRY OF INSECT COLOURS.—The kind response that my request for specimens for this investigation (Entom. 131) has already met with, emboldens me to ask if any readers of this journal can let me have a specimen or two each of the following British species, which I should like to examine in time to tabulate and publish the results in their proper connection with those already to hand. As previously explained, broken specimens will answer perfectly; and I need only the wings. It will be noticed that several of these present desiderata are *green*,—a colour

sufficiently uncommon to make me anxious to examine it in as many and as unrelated species as possible, in order to supplement the not altogether uninteresting results that I have already obtained from green Lepidoptera. The species desired are:—*L. pectinataria*, *C. psitticata*, *C. miata*, *D. orion*, *A. præcox*, *A. aprilina*, *A. herbida*, also *B. parthenias* or *B. notha*, *P. chrysis* (or any allied metallic-marked species), *T. fimbria*, *P. hamula*, *F. conspicuata*, *T. amataria*, *C. ferrugata*, *C. munitata*, *N. russula*, *L. arion*, and—were it not asking too great a rarity—*H. auroraria* and *A. rubricata*.—F. H. PERRY COSTE.

GAS-LAMP ENTOMOLOGY.—As the question whether the Sphingidæ are attracted by the light from gas-lamps is still being discussed in the 'Entomologist,' it may be of interest to mention that I have on more than one occasion taken *Smerinthus populi* at gas-lamps in this neighbourhood. It may also be worth mentioning that in August, 1887, I took a specimen of *Macroglossa stellatarum* on the window of a public-house on the road from Broadstairs to St. Peters, in the Isle of Thanet. The insect had evidently been attracted by the gas in the public-house, and had got caught between the glass of the window and a sliding piece of glass running parallel to it about half an inch away, and extending about two feet up the window, on which the name of the establishment, or some other notice, was engraved.—HENRY A. HILL; 132, Haverstock Hill, N.W., April 2, 1890.

With regard to taking Sphingidæ at light, I may mention that the electric-light at Davos Platz is often visited by *Sphinx convolvuli* and *Deilephila euphorbiæ*, but owing to the height of the lamps it is very hard to work them successfully. Last year a friend showed me a great many Sphingidæ taken at light in the Engadine, chiefly *D. euphorbiæ*.—LEONARD S. SELLON; Thusis, Grisons.

NOTES ON LEPIDOPTERA FROM ABERDEEN AND KINCARDINESHIRE.—During the last three seasons I have collected in the above two shires of Scotland, and have done my best to become acquainted with all the species to be obtained in those counties. With the help of some of my fellow-collectors, I have managed to compile a very respectable list, as follows:—*Pieris brassicæ*, *P. rapæ*, *P. napi*, all common. *Argynnis selene*, *A. aglaia*, common in marshy places. *Vanessa polychloros*, occasionally; *V. urticæ*, common in spring and autumn; *V. atalanta*, *V. cardui*, occasionally common. *Erebia epiphron*, scarce; I have not taken this species myself. *Satyrus semele*, common on the coast. *Epinephele ianira*, common everywhere. *Cænonympha typhon*, common, but local; *C. pamphilus*, common. *Thecla rubi*, common, but local. *Polyommatus phlæas*, common in spring and autumn. *Lycæna astrarche*, var. *artaxerxes*, common, but local; *L. icarus*, common; *L. minima*, common along the coast. *Acherontia atropos*, one taken by a fisherman last year; I have heard of others being taken before I collected. *Sphinx convolvuli*, five taken; two of these I have. *Deilephila galii*, four taken; three by other collectors, and one by myself. *Chærocampa celerio*, one taken by myself in a clothier's shop in George Street, Aberdeen, during my first year; I have not heard of any other specimen being taken; *C. porcellus*, occasionally common along the coast. *Smerinthus populi*, larvæ, very common. *Zygæna exulans*, not uncommon; I have not taken it myself; *Z. filipendulæ*, common along the coast. *Hylophila prasinana*, occasionally. *Nudaria mundana*, common along the coast of Kincardineshire. *Lithosia lurideola*, occasionally.

Nemeophila plantaginis, common. *Arctia caia*, common. *Spilosoma menthastri*, common, but local. *Hepialus humuli*, common; *H. velleda*, common; *H. lupulinus*, common, but local; *H. hectus*, occasionally. *Dasychira fascelina*, not uncommon in marshy places. *Orgyia antiqua*, larvæ, common on willows. *Bombyx rubi*, *B. callunæ*, common on the heath. *Saturnia pavonia*, also common on heath. *Dicranura furcula*, larvæ, occasionally; *D. vinula*, larvæ, common. *Lophopteryx camelina*, larvæ, occasionally. *Notodonta dictæa*, sometimes very common; *N. dromedarius*, larvæ, occasionally. *N. ziczac*, larvæ, common. *Thyatira batis*, occasionally common at sugar. *Bryophila perla*, occasionally at light. *Demas coryli*, larvæ, occasionally. *Acronycta psi*, common; *A. runicis*, occasionally; *A. menyanthidis*, *A. myricæ*, not uncommon at sugar. *Leucania conigera*, common along the coast; *L. lithargyria*, occasionally common; *L. impura*, *L. pallens*, common. *Tapinostola fulva*, not common. *Hydræcia nictitans*, common; *H. micacea*, also common, mostly at light. *Xylophasia rurea*, very common; *X. lithoxylea*, common, but local; *X. monoglypha* (*polyodon*), very common. *Charæa graminis*, common on the ragwort. *Cerigo matura*, not common. *Luperina testacea*, common at sugar, and also at light. *Mamestra albicolon*, not uncommon along the coast; *M. furva*, not very common; *M. brassicæ*, common. *Apamea basilinea*, common; *A. gemina*, also common; *A. unanimitis*, rare; *A. didyma*, very common. *Miana strigilis*, not common; *M. fasciuncula*, very common; *M. literosa*, not so common as the former. *Celæna haworthii*, sometimes common. *Stilbia anomala*, rare; I have not taken it myself. *Caradrina quadripunctata*, common all the year round. *Eusina tenebrosa*, males common, but females rare to find. *Agrotis vestigialis*, common on the ragwort along the coast; *A. suffusa*, sometimes common in spring and autumn; *A. segetum*, very common, mostly along the coast; *A. exclamationis*, also very common; *A. cursoria*, *A. nigricans*, *A. tritici*, very common along the coast on the ragwort, also at sugar; *A. agathina*, rare; *A. strigula* (*porphyrea*), flying very commonly when beginning to get dusk; *A. simulans*, occasionally, but not common. *Noctua glareosa*, *N. augur*, *N. plecta*, *N. c-nigrum*, always common; *N. triangulum*, sometimes common; *N. brunnea*, *N. festiva*, v. *conflua*, *N. dahlîi*, *N. rubi*, *N. umbrosa*, *N. baia*, *N. neglecta*, sometimes very common where there is heath; *N. sobrina*, occasionally, but not common; *N. xanthographa*, very common everywhere. *Triphæna ianthina*, occasionally; *T. fimbria*, rare; *T. comes* (*orbona*), very common; I was informed of one of the rare *T. orbona* (*subsequa*), taken near here, but when I saw the specimen I found it was only an uncommon form of *T. comes*; *T. pronuba*, common; I have seen this species on the wing from June to October. *Amphipyra tragopogonis*, not common. *Mania typica*, common. *Panolis piniperda*, not common. *Pachnobia rubricosa*, common. *Tæniocampa gothica*, common. *Orthosia suspecta*, common, but local; *O. macilenta*, also common and local. *Anchocelis rufina*, very common; *A. litura*, sometimes common. *Cerastis vaccinii*, common in spring and autumn. *Scopelosoma satellitia*, common and local. *Xanthia fulvago* (*cerago*), sometimes common; *X. flavago* (*silago*), not so common; *X. circellaris*, common. *Calymnia trapezina*, not common. I have one of the *Dianthæciæ* that was named for me as *D. compta*, but has been doubted; *D. cucubali* has been taken here, but not common. *Polia chi*, common, but local. *Dasyptolia templi*, occasionally. *Aporophyla lutulenta*, not common, mostly along the coast; *A. nigra*, sometimes

common. *Miselia oxyacanthæ*, occasionally. *Agriopsis aprilina*, not common. *Euplexia lucipara*, sometimes common. *Phlogophora meticulosa*, occasionally, but not common. *Aplecta prasina*, *A. occulta*, *A. tincta*, has been taken here, but not common. *Hadena adusta*, very common; *H. glauca*, not common; *H. dentina*, common, mostly on the coast; *H. oleracea*, common everywhere; *H. pisi*, fairly common, the larva is found commoner than the insect; *H. thalassina*, not common; *H. rectilinea*, sometimes common, but has been scarce this year. *Calocampa vetusta*, *C. exoleta*, common in spring and autumn. *C. solidaginis*, common at rest on trunks of fir trees, and also comes freely to sugar. *Cucullia umbratica*, not common. *Gonoptera libatrix*, very local, and not common. *Habrostola tripartita*, common. *Plusia chrysitis*, common amongst nettles; *P. bractea*, rare; *P. festuæ*, rare; *P. pulchrina*, common; *P. gamma*, common in spring and autumn; *P. interrogationis*, sometimes common. *Anarta myrtilli*, flies commonly when the sun shines. *Chariclea umbra*, rare. *Phytometra viridaria*, occasionally. I have been informed of one *Catocala fraxini*, taken at sugar in Aberdeen about the end of September this year. *Rumia luteolata*, common everywhere. *Metrocampa margaritaria*, common and local. *Ellopiæ prosapiaria*, also common and local. *Selenia bilunaria*, common. *Odontopera bidentata*, common. *Crocallis elinguaris*, common. *Boarmia gemmaria*, very common. *Gnophos obscuraria*, local and not common. *Geometra papilionaria*, common, but local; I have not taken this species myself. *Acidalia aversata*, common, but local. *Cabera pusaria*, also common, but local. *Macaria liturata*, occasionally. *Scodiona belgiana*, scarce. *Fidonia carbonaria*, rare. *Ematurga atomaria*, common. *Bupalus piniaria*, very common. *Abraxas grossulariata*, common in gardens. *Cheimatobia brumata*, *C. boreata*, common. *Oporabia dilutata*, common; *O. autumnaria*, not common. *Larentia didymata*, *L. multistrigaria*, *L. cæsiata*, *L. viridaria*, always common. *Emmelesia albulata*, common along the coast; *E. minosata*, not common. *Eupithecia oblongata*, common; *E. satyrata* v. *callunaria*, common, but local; *E. indigata*, also local; *E. nanata*, *E. vulgata*, *E. lariciata*, common; *E. pumilata*, common, but local. *Thera variata*, common; *T. firmata*, not common. *Hypsipetes ruberata*, rare; *H. trifasciata*, fairly common, but local; *H. sordidata*, common everywhere. *Melanthia bicolorata*, common, but local; *M. ocellata*, common. *Melanippe sociata*, common; *M. montanata*, *M. fluctuata*, also very common. *Anticlea nigrofasciaria*, rare. *Coremia munitata*, common; *C. designata*, scarce. *Camptogramma bilineata*, common everywhere. *Cidaria miata*, occasionally; *C. truncata*, *C. immanata*, *C. suffumata*, *C. silacea*, *C. prunata*, *C. testata*, *C. populata*, *C. fulvata*, *C. dotata*, always common. *Eubolia limitata*, common; *E. plumbaria*, common, but local. *Anaitis plagiata*, common. *Chesias spartiata*, common; *C. rufata*, not common. *Tanagra atrata*, common along the coast. I have not yet done much in collecting Micro-Lepidoptera here, but I intend to work these next year, and hope to be able to give a good report of the species that occur here.—L. G. ESSON; 46, North Charlotte Street, Aberdeen, N. B.

HYPSIPETES SORDIDATA (= ELUTATA).—It would be interesting if entomologists, working districts where both the sawfly and bilberry forms of this species occur, would make notes of the times of appearance of each form. In North Devon, I noticed that the smaller specimens, whose larvæ feed on bilberry, had passed their zenith before the larger, sawfly-feeding speci-

mens were out in any number. Observations bearing on this question would be valuable.—RICHARD SOUTH.

HESPERIA LINEOLA.—I find that I have a very much worn specimen of this butterfly, which was captured within a few miles of Sudbury, Suffolk, in July, 1886.—V. GERRARD; 47, Foulden Road, Stoke Newington, N., April 22, 1890.

EARLY APPEARANCE OF DASYCHIRA PUDIBUNDA.—On Jan. 28th I found a male *Dasychira pudibunda*, flying against the window inside the billiard-room. I suppose the larva must have got inside the house and pupated there, and been "forced" by the warmth of the room, unless the unusually mild weather had induced it to emerge from the chrysalis out of doors, and the moth had got into the house afterwards, which I should hardly think likely.—W. M. CHRISTY; Watergate, Emsworth, Hants.

BRITISH DIPTERA.—Mr. Brunetti, in his notes on Diptera (Entom. 122), has in several cases given incorrect localities. The following should be Wyre Forest, not Birmingham:—*Scenopinus fenestralis*, *Dolichopus brevipennis*, *Pyrophana rosarum*, *Xylota abiens*, *Microdon devius*, *Lasiops semicinerea*. I have also taken *Sapromyza platycephala*.—R. C. BRADLEY; 252, Mosely Road, Birmingham.

LOCALITY LABELS FOR SPECIMENS.—Although many entomologists in this country make a practice of affixing labels, bearing locality and date of capture, to the insects in their collection, it is rather the exception than the rule that specimens one receives from, or sends to, correspondents have any such data attached. The reason for this is obvious. To write the necessary number of tiny labels for our own cabinet specimens entails the expenditure of considerable time and patience; so if we were to supply the pins of our duplicates also with "tickets," the time we have to devote to entomological work would be seriously encroached upon. Of course information concerning localities and dates are generally obtainable, and are to be had from our correspondents for the asking; but this often means additional letter writing and postage, even if one ignores the possible element of doubt which may enter into the matter. It is, perhaps, not too much to say that the custom of "localising" specimens would be more general than it is if the business could be done with greater facility and expedition. Writing these labels is tedious work, but to have them printed in small quantities would be expensive. If, however, they could be obtained in England, as on the continent, in sheets, it is probable

"That some would label then who never did before,
And those who had begun would label many more."

If these remarks should come under the notice of anyone connected with printing, perhaps he might conceive the idea of publishing a series of labels as an experiment. If so, I would suggest that unless he is prepared to do the thing in a large way, it would hardly be worth doing at all. The first step would be, of course, to ascertain as far as possible the localities most likely to be required. This could be done by inviting entomologists to furnish lists of places that would be useful to them, and which they would use if printed. When a sufficient number of localities were received, they could be arranged in series representing the following divisions of Great Britain:—Scotland: 1. Highlands; 2. Lowlands; 3. Isles. England and

Wales: 1. North; 2. South; 3. East; 4. West; 5. North-east; 6. North-west; 7. Midlands, N.; 8. Midlands, S.; 9. South-east; 10. South-west. Ireland: there are, unfortunately, so few collectors in Ireland, that one series for this country would probably suffice, even, perhaps, if the Isle of Man were included therewith. The dates could not be printed on labels in series for general use, but these could be quickly and easily written, either on the back or face of the label, thus:—4.90 = April, 1890.—R. S.

ERRATA.—P. 132, line 6 from top, for "my" read "any." P. 160, line 11, for "Fallon" read "Fallou"; line 13, "HOMOPTERA.—Fam. FULGORIDÆ" should be placed so as immediately to precede "Subfam. EURYBRACHYDINÆ."

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*April 2nd, 1890.*—Mr. Frederick DuCane Godman, M.A., F.R.S., Vice-President, in the chair. Mr. G. Bryant, of 6, Oakley Crescent, Chelsea, S.W.; Mr. A. E. Hall, of Norbury, Pitts Moor, Sheffield; Mr. J. J. F. X. King, of 207, Sauchiehall Street, Glasgow; Mr. H. C. Oakshott, of De Beauvoir House, Falmouth; Mr. A. E. Stearns, of the Lodge, Upper Halliford, Walton-on-Thames; and Mr. G. Vigers, of Hersham, Surrey, were elected Fellows; and Mr. A. B. Farn was admitted into the Society. Mr. Godman announced the death of Mr. Joseph S. Baly, of Warwick, the well-known coleopterist, who had been a member of the Society for the last forty years. Dr. Sharp exhibited and made remarks on a female specimen of a coleopterous insect—*Temnochila quadricollis*, Reitt.—which was the subject of a very unusual malformation of the nature termed "ectromélie" by Lacordaire. Mr. R. W. Lloyd exhibited three specimens of *Elater pomonæ*, taken at Brockenhurst, in the New Forest, about the middle of March last. Colonel Swinhoe exhibited, and read notes on, a number of butterflies of the genus *Euthalia*. He pointed out that the specimens described as a species by the name of *Euthalia sedeva* were only the females of *E. balarama*. Mr. T. R. Billups exhibited male and female specimens of *Cecidomyia salicis-siliqua*, Walsh, which had just emerged from galls received from Mr. Cockerell, who had collected them on a species of willow in Colorado. He also exhibited three species of Ichneumonidæ new to Britain, viz., *Ichneumon haglundii*, Holmgr., bred by Messrs. Adkin and Barker from *Arctia fuliginosa*; *Phygadeuon rufo-niger*, Bridg., taken in Ashdown Forest in November, 1885; and *Phygadeuon sodalis*, Tasch., taken at Dulwich in June, 1889. Mr. C. G. Barrett exhibited specimens of *Bryotropha obscurella*, Hein, and *Doryphora elongella*, Hein, two species of Lepidoptera new to Britain. Dr. Thallwitz, of Dresden, contributed "Notes on some species of the genus *Hilipus*." These notes had reference to a paper on the genus *Hilipus*, by Mr. F. P. Pascoe, published in the 'Transactions' of the Society for 1889. Mr. E. Meyrick read a paper entitled "The Classification of the Pyralidina of the European Fauna." Mr. Kirby, Mr. McLachlan, Mr. Stainton, Capt. Elwes, and Mr. Barrett took part in the discussion which ensued. Prof. Westwood communicated a paper

entitled "Notes on certain species of Cetoniidæ." Mynheer P. C. T. Snellen, of Rotterdam, contributed a paper entitled "A Catalogue of the Pyralidina of Sikkim collected by H. J. Elwes and the late Otto Möller," and Capt. Elwes read certain notes on the foregoing paper as an Appendix. Mr. W. L. Distant, Colonel Swinhoe, Mr. M'Lachlan, and Mr. Jacoby took part in the discussion which ensued. — H. Goss, *Hon. Sec.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY. — *March 27th, 1890.*—J. T. Carrington, F.L.S., President, in the chair. Mr. C. G. Barrett exhibited a series of *Dianthæcia carpophaga*, Bork., showing fully its connection with its variety *D. capsophila* Dup., a specimen of *D. luteago*, Hb., v. *barrettii*, Dbl., all reared by Mr. Blandford, from larvæ found in South Wales; specimens of the original *Catoptria parvulana*, Wilk., taken by Messrs. Bond and M'Lachlan, with recent specimens reared and taken by Messrs. Fletcher, Bankes, and Vine, with intermediate forms, which Mr. Barrett stated proved its identity with *C. scopoliana*, Haw.; also a specimen of *Botys mutualis* (a native of Asia and Africa), taken by Mr. Gregson some years ago, in Lancashire, doubtless accidentally introduced. Mr. Adkin, examples of *Hibernia rupicaprararia*, Hb. Mr. Joy, an immature specimen of *Mantis religiosa*, from the Suez Canal. Mr. T. R. Billups, several species of Ophionides, bred by members of the Society; amongst others *Paniscus testaceus*, Gr., and *P. cephalotes*, Holmg. and *Ophion luteum*, L., bred by Mr. Barker from the larvæ of *Dianthæcia capsicola*, Hb., the latter species also being reared by Mr. Wellman from *Hadena pisi*, L., and by Mr. South from *Toxocampa cracca*, Fr. Mr. Billups called particular attention to the fact that the cocoons of *Ophion luteum* differed considerably according to the host from which bred. He also called attention to the extreme variability in size of *Paniscus cephalotes*, two females taken by himself at Hayling Island in 1866 being not above one-third larger than the female bred by Mr. Barker. In the same box were shown *Banchus moniliatus*, Holmg., bred from the larvæ of *Panolis piniperda*; also both sexes of *Exetastes osculatorius*, Fab., from the larvæ of *Retinia pinicolana*, Dbl., by Messrs. South and Adkin. Among Mr. Billups's other exhibits were a specimen of *Phygadeuon sodalis*, Tasch., taken in his own garden, June 1st, 1889, and a female of *Hemiteles macrurus*, Tasch., taken at the same place, August, 1889, both species being new to Britain; *Phygadeuon* (*Microcryptus*) *rufoniger*, a species new to science, one of several females taken by Mr. Billups in Ashdown Forest, November, 1885, was stated to have been described by Mr. Bridgman in the 'Transactions' of the Entomological Society for 1889. Mr. Perks showed pond-life from Barnes Common, and Mr. Tugwell and Mr. Step exhibited botanical specimens and contributed remarks on their respective exhibits.

April 10th.—The President in the chair. Lieut. E. W. Brown and Mr. R. McAllan were elected members. Mr. Tugwell exhibited a series of *Tephrosia crepuscularia*, W. V., and *T. biundularia*, Bork., with water-colour drawings of both larvæ from life, and remarked that after breeding both insects, he was perfectly convinced as to their being distinct species, although evidently closely allied. *T. crepuscularia* appeared from the last week in March to the middle of April, and

was always partly a double-brooded species; *T. biundularia* appeared early in May until the first week in June, and was only single-brooded; in every case the insect remained true to the parent type; and although the markings were somewhat alike in both species, yet there were characteristic differences as shown in the series exhibited; this also applied to the larval stages. Mr. Barrett and Mr. Tutt made some observations on this exhibit, the latter gentleman agreeing with Mr. Tugwell, but the former was of opinion that *crepuscularia* and *biundularia* were not distinct. Mr. Turner showed a very light form of *Nyssia hispidaria*, Fb., from Richmond. Mr. Carpenter also exhibited varieties of the same species. Mr. Fenn, a long series of *Larentia multistrigaria*, Haw. Messrs. Skinner, B. W. Adkin, and Mr. West exhibited Coleoptera, the latter gentleman a very interesting collection from the Colombian Republic. Messrs. E. Step, W. Manger, C. G. Barrett, Tugwell, Billups and others, also exhibited.—H. W. BARKER, *Hon. Sec.*

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—*March 20th.*—J. A. Clark, F.E.S., in the chair. Mr. Quail exhibited a specimen of *D. galii*, Schiff., captured at Stoke Newington in July, 1888. Mr. Simes, a remarkably small *E. cardamines*, L., taken in Epping Forest, May, 1889. Mr. J. A. Clark, two varieties of *T. gothicina*, H.-S., the wings of one specimen, although having the markings of this species, strongly resemble *T. incerta*, Hufn., in shape. Mr. Whittle, a series of *Catoptria juliana*, Curt., and *Pædisca oppressana*, Tr. Mr. Lewcock read a paper on behalf of Mr. Robert Gillo, of Bath, on the occurrence of aquatic Coleoptera at Burnham, Somerset, in September, 1889. It appeared therefrom that Mr. Gillo, by persistently working the district, day after day, had obtained forty-two species; included in this number were *Pelobius hermanni*, F.; *Haliplus mucronatus*, Steph.; *Hydrophilus piceus*, L.; *Dytiscus circumflexus*, F., and *D. punctulatus*, F.; in addition to these, he also found several species of *Elmis*, Latr., and *Parnus*, Fabr. Mr. Lewcock also read a paper on behalf of Mr. P. W. Jarvis, of Cape Town, on the "Coleopterous Fauna of South Africa." The number of species taken south of the Zambezi amount to upwards of 8000; Madagascar, having a distinct fauna of its own, is not included in the South-African list. The district appears to be very rich in Cicindelidæ, having about 50 species. The genera *Carabus* and *Pterostichus* are not represented, but in place of them are twelve species of *Anthia*, which are larger and far more powerful than our largest *Carabus* beetle, and twelve of the genus *Polyhermia*, which also are highly voracious insects; three species of the latter are so deeply pitted as to give the elytra the appearance of being perforated. A species of *Brachinus* found near Cape Town is three quarters of an inch in length, and the explosion emitted by it is in proportion to its size. Aquatic species are fairly represented; but Staphylinidæ are not quite so numerous as in Britain, although M. Fauvel has recently described fifty new species. Necrophagous beetles are not numerous, but several species of Histeridæ exceed three-quarters of an inch in length. Upwards of five hundred Lamellicornia are found. Some species of *Helioropris*

attain two inches in length; the genus *Onthophagus* (thirty species) contains many gaily-coloured beetles,—*O. rangifer* is of a brilliant ruby. The one hundred species of Buprestidæ are generally large in size. Elateridæ are not common. The genera *Telephorus* and *Malachius* are extensive, and most of the species common. The Tenebrionidæ, numbering over 400, inhabit the sandy veldt. Cantharidæ, some of which are prettily marked, find sixty-two representatives. South Africa also possesses a vast quantity of weevils, many of which are not found in other parts of the world. The *Longicornia* are much finer than the British insects, especially the Transvaal species. Chrysomelidæ are moderately common, some very showy. The genus *Donacia* is conspicuous by its absence. Cassidæ are large and numerous. The Hispidæ (twelve species) are very strange-looking creatures, being covered with spikes about two lines long. Mr. Jarvis also gave information respecting the best time for collecting, and the names of the coleopterists of Cape Town.

April 3rd.—The President in the chair. Mr. Raine exhibited a bred specimen of *P. rapæ*, L., without black tips to the wings. Mr. Clark, a series of *Rhodaria sauguinalis* from north of Ireland. Mr. Smith, a bred specimen of *A. atropos*, L., from Dartford. Mr. A. U. Battley read a paper on the entomology and geology of the London Basin. The discussion which followed was taken part in by Messrs. Clark, Cripps, Lewcock, and others.—G. A. LEWCOCK and E. HANES, *Hon. Secs.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY. — *March 17th, 1890.* — The President, Mr. W. E. Blatch, in the chair.—Messrs. C. R. Parsons and H. R. Hodgkinson were elected members of the Society. Mr. R. C. Bradley showed *Asphalia flavicornis*, from Solihull, in one of which the stigmata had coalesced. Mr. H. M. Lee showed three *Hesperia*, apparently *lineola*, which he had found in a collection, and which he believed had been taken in Jersey. Mr. C. S. Wainwright showed a collection of insects from Columbia, S. America, including some fine *Morphos*, *Papilios*, *Heliconias*, &c. Mr. W. E. Blatch read a note on a new species of the family Scydmenina, which he proposed to call *Neuraphes planifrons*. It was taken under bark of birch-stumps, in company with *Scydmenus godarti* and *S. exilis*, at Sherwood Forest.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

REVIEWS.

Larva Collecting and Breeding: a Handbook to the Larvæ of the British Macro-Lepidoptera and their Food-plants, both in nature and confinement; with Authorities. By the Rev. J. SEYMOUR ST. JOHN, B.A. Pp. 165. London: Wesley & Son. 1890. Post 8vo.

From the title, it might be gathered that some hints on collecting and treating lepidopterous larvæ would be found in the work; but, as a fact, there is nothing of the kind, and the second part of the title alone would have sufficed.

Although it treats only of the Macro-Lepidoptera, the author of this little book deserves the thanks of British lepidopterists for the painstaking

way in which he has accumulated, prepared, and presented in handy form a large amount of interesting data concerning the larval food-plants of species occurring in this country. The book is divided into two parts. In the first, the larvæ are enumerated in classified order, and, where known, the food-plants upon which they feed are given. In the second part, the plants are arranged in accordance with the 'London Catalogue of British Plants,' 8th ed.; and the larvæ known to feed on each plant are mentioned. Reference to the work or works where the larva is described, or some observation on its economy recorded, enhances the value of this portion of the book; and it is to be regretted that in the first part, where it could have easily been done, no mention is made of the month or months in which each larva occurs.

For the benefit of those who may not be botanists, the common English names of the plants are added in both divisions, and an index to the second part provided. The lepidopterous genera of the first part are also included in this index. Altogether Mr. St. John is to be congratulated upon the production of a work which will certainly prove useful alike in the field or study.—R. S.

The Coleopterous Fauna of the Liverpool District. By JOHN W. ELLIS, M.B., F.E.S., &c. One vol. 8vo. Liverpool: Turner, Routledge & Co. 1889.

THIS is a reprint from the 'Proceedings' of the Liverpool Biological Society, vols. ii., iii. Unfortunately, the original pagination has been retained, the first part commencing on p. 182, and the second part on p. 46.

The area dealt with is "that portion of Lancashire and Cheshire falling within a circle having a radius of fifteen miles from the Liverpool Town Hall." The systematic arrangement is very nearly that of the 'Catalogue of British Coleoptera,' by the Rev. Canon Fowler and the Rev. A. Matthews. In compiling his list the author has been careful to produce something more than a mere enumeration of the species of Coleoptera occurring in the district. Where necessary, exact localities are given, frequently accompanied by observations on habits, &c.; the published records, entomological diaries of, and information otherwise conveyed by, local workers, together with his own special knowledge, are the sources from which such data have been obtained.

Altogether, about 30 per cent. of the British beetles appear to be found in the Liverpool district, the exact number being 990 species as against 3227 species of Fowler and Matthews's List. This number is divided among the several groups as follows:—Geodephaga, 163; Hydradephaga, 66; Palpicornia, 49; Brachelytra, 250; Clavicornia, 156; Lamellicornia, 42; Serricornia, 50; Longicornia, 8; Monilicornia, 51; Heteromera, 31; Rynchophora, 124.—R. S.

OBITUARY.

JOSEPH S. BALY.—It is with regret we have to record the death of Mr. Joseph S. Baly, of Warwick. A notice of his entomological work will appear next month.

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[No. 325.

ON THE OCCASIONAL ABUNDANCE OF CERTAIN SPECIES OF LEPIDOPTERA IN THE BRITISH ISLANDS.*

BY R. ADKIN, F.E.S.

THE sporadic appearance in these Islands of certain species of Lepidoptera is a subject that has received a large amount of attention, and many theories have been advanced to account for the phenomenon: these may be grouped into two great classes, which may for present purposes be termed the "migration" and the "local causes" theories.

The British Islands, as we now know them, have a superficial area of some 121,000 square miles, and enjoy a temperate climate, but such favourable conditions were not always existent; at some former period this country was a land of snow and ice, probably not differing much from what Greenland now is, and the majority of our present species could not have lived under such climatic conditions: it is probable that at this time these Islands formed a portion of the continent of Europe, and that upon the glacial conditions giving way to a period of milder temperatures, a fauna suitable to the altered circumstances of climate would follow in due course. If we compare representatives of our more generally distributed species with those inhabiting Continental Europe, we find the majority of them are identical, and we arrive at the conclusion that they are of common origin. Further, the conviction is forced upon us that our present insect fauna has been derived from the Continent, and that it has been brought about by the several species gradually extending the area of their distribution. This would appear to indicate an initial migratory condition which it is easily conceivable would be subject to such modification as became necessary from time to time in the economy of a species; and the cutting off of the

* Abstract of a Paper read before the South London Entomological and Natural History Society, April 24, 1890.

British Islands from the mainland of Continental Europe cannot be regarded as imposing an obstacle that would not be easily overcome by migratory instincts thus engendered. If, however, the sphere of our observations is confined entirely to these Islands, we have great difficulty in detecting cases of probable immigration; for although the evidence may strongly favour migration, it may not be conclusive, and the circumstance might be referable to other causes. But if we find insects moving in numbers in situations where their presence cannot be accounted for in any other way, we may safely conclude that they are in a state of migration; the meeting with a swarm of *Deiopeia pulchella* in Mid-Atlantic is a case in point, and many other instances are on record referring to other species, and extending even to our shores. The reports furnished, through the courtesy of Mr. Cordeaux, by sundry Lighthouse keepers, although not numerous, are of great importance; those from Guernsey and Heligoland, referring to vast flights of *Plusia gamma*, *Hybernia defoliaria*, &c., passing frequently in a westerly direction, have a distinct bearing upon the subject.

On the other hand, there is the probability that the surroundings of a species during its metamorphoses would affect its subsequent abundance or scarcity: the evidence under this head is at best incomplete, but as far as it goes it is of importance. The females of many species deposit large numbers of ova, yet we do not find a corresponding annual increase in the number of the imagines of such species; their natural enemies hold them in check. If, therefore, we are to account for the cases of occasional abundance by purely local influences, we must find some irregularity in the working of Nature. It has been suggested that the insect may remain in one of its quiescent stages for an unusually prolonged period,—for instance as pupa, numerous cases are on record, but they tend to show that the second year is seldom exceeded, and in such cases as it is the number of emergences are proportionately smaller. But perhaps the most important of local causes is that of meteorological conditions: mild winters and cool summers are said to be detrimental to Lepidoptera, while hard winters and sunny summers are held to be favourable, and so forth; observation appears to prove that such is the case, but that the effect is upon Lepidoptera generally rather than upon a few species, and it is worthy of remark that some of the cases of greatest abundance of *Vanessa cardui* and *Plusia gamma* have occurred in cold wet seasons, when other species have been actually much less common than usual.

As examples of species exhibiting tendencies to occasional great abundance the following may be mentioned:—*Hybernia defoliaria*, *H. aurantiaria*, *Oporabia dilutata*, *Cheimatobia brumata*, *C. boreata*, and *Orgyia antiqua*. These all have apterous females,

the abundance is more often noted in the larval than in the perfect state, and the districts affected are generally of small area,—all facts tending to the probability of local influences being the immediate cause; but we must not overlook the report from Heligoland Lighthouse, which distinctly mentions large flights of *H. defoliaria*, &c. It must not be supposed that these would include the wingless females; but it is far from improbable that the arrival of numbers of the opposite sex would materially affect the status of the species here, and possibly become a factor in the occasional abundance of the larva. *Pieris brassicæ* has been observed moving in immense numbers, both at sea and on our coasts, and the migratory swarms of *Vanessa cardui* that passed through many parts of Continental Europe in 1879 were the forerunners of an abundance of the species in this country in the same year. *Colias edusa*, *Acherontia atropos*, *Sphinx convolvuli*, *Deilephila galii*, and *Plusia gamma*, also furnish a considerable amount of evidence, which, however incomplete it may be, tends to the conclusion that immigration is a chief factor in the causes of great abundance occasionally observed, and in some instances the direct and only cause.

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CHALCOPHORA IN THE SCRUBS OF CENTRAL QUEENSLAND.

By GEO. BARNARD.

ONE hot day in January, the thermometer at 94° in the shade, we—that is, I and my sons—determined to have an entomological hunt for some of the fine *Chalcophora* inhabiting the scrubs in our neighbourhood. A hot bright day, though unpleasantly warm for us, was just the time for the sun-loving beetles, to be showing in abundance. We started, therefore, in anticipation of a good day's sport, and, as the sequel will show, we were not disappointed. A walk of little over a mile brought us to the edge of a large scrub, fringed by what is commonly called oak, a species of *Casurina*. This was the feeding-ground of *Chalcophora vittata*, which eats the leaves of the oak. A heavy thud with a tomahawk jars the tree, and causes any *vittata* to fly off with a loud buzz, and if it flies low,—which it generally does at the first drop,—being a heavy flyer it is speedily netted. Many escape by flying too high, the bushes always hindering more or less and making it heavy work; so after catching about a dozen we decided to move on and look for *C. ajax*, one of the finest of our *Chalcophoræ*. This insect feeds on the leaves of a broad-leaved species of *Eucalyptus*,—a heavy gnarled tree, putting one in mind of the grand old oaks at home. These trees are scattered singly in the

dense parts of the scrub, and the close heat made forcing our way through very tiring work.

On our way we flushed some "Wonga-wonga" pigeons, and presently put up a pair of green-winged pigeons (*Chalcophaps chrysochlora*), and a little further on some wallaby (a small species of kangaroo which only lives in the scrubs), were sitting up viewing us very suspiciously. The boys began regretting leaving their guns at home, and I had to remind them that we were looking for insects, not birds or animals.

Having found a likely tree, the next question was how to get at *ajax*, which would be found feeding on the topmost leaves. This was speedily solved by the boys taking off their boots, and with a tomahawk cutting notches in the bark, by which they easily ascended the butt of the tree, black-fellow fashion, hauling up the net afterwards and proceeding to business. When seen on the leaf, the net is gently placed underneath; a slight upward movement and the beetle drops quietly in, and is then transferred to a small box, each being kept separate on account of a yellow pollen matter covering the wings, which if rubbed off takes away a great deal of the beauty of the insect. After getting some two dozen, and the sun reminding it was time to look after the inner man, we made for a water-hole, where we proceeded to eat our lunch and discuss the probability of finding *C. superba* on our way home. Finishing our repast, we endeavoured to pass half an hour away in resting, not, as my readers may suppose, enjoying the "Dolce far niente" in the tropical shade, but trying to imagine we were getting a little cooler by keeping quiet, the perspiration meanwhile standing out in beads on our faces and hands, and a few mosquitoes gently intimating that it was not the time to sleep,—so to work again and forward. Not far off, a tree commonly called a "mess-mate" appeared in full bloom, the flowers, in clusters, much resembling those of the *Eucalyptus*. This was a prize, for here was the haunt of the flower-loving Buprestidæ. The tree was soon scaled, and an exclamation of delight escaped one of the boys as he extracted from his net a large lovely *Stigmodera* (since found to be new), closely resembling *S. similis*, about an inch and a half in length, straw-coloured, with lower part of elytra and thorax metallic-blue. This was the great find of the day. Five specimens were taken, besides some seven other species of *Stigmodera*, all small and mostly known to us, besides a host of smaller beetles, but no Lepidoptera, which was rather surprising considering the apparently favourable season. Pretty well satisfied so far, and the day wearing on, we retraced our steps, making for a patch of "lance-wood" that lay on our way home. Soon after reaching this patch a large *C. superba* was espied walking down a tree (a peculiarity they have), a splendid fellow! the golden green lines glistening in the

sun, and his large eyes—seemingly endowed with reason—intently watching us. Cautiously we approached, net in hand, preparing to strike, but he was not to be had. As we drew near he began to move round the tree, always keeping us at the same distance, and moving upwards, until with a rush we tried to secure him, only to see him fly off to the top of another tree, safe in his glory for the time being, and leaving us lamenting his non-capture. This is about the most difficult Buprestid to secure, for, though of large size, it is as nimble as a mouse, and really like that animal in its movements. A dull day is best for them, as they are then more lethargic. However, to return, after spending a considerable time and meeting with many disappointments, we got seven amongst us,—not bad, considering all things. By this time the sun was low, and we were still some distance from home. We had wanted to go through some trees near the edge of the scrub, where *quadrisignata* is usually to be found, but it was getting late, and these insects as well as persons go to bed, the former generally before sunset, so there was not much chance of getting any, still we determined to have a try. The wallaby were now on the move, going, like ourselves, towards the edge of the scrub where they feed at night, and other tokens gave warning that the tropical night would soon be on us. Hastening on, we came to the trees in question, but almost too late. However, by dint of hammering on the butts (they were only trees of six or eight inches through), a few *quadrisignata* were dislodged and easily secured, as they dropt almost to the ground. Completely wearied we now made for home, where we arrived hot, tired, and dirty, but not altogether dissatisfied with our day's work.

So ended one of my many rambles in the Queensland Bush for the purpose of collecting all kinds of Nature's specimens. Their arrangement and keeping has given me many a pleasant hour, especially when, in a time of drought and threatened ruin, one's spirits were inclined to go below zero.

Should anyone from the "Old Country" be tempted to pay me a zoological visit, we, or rather my boys (I am getting too old), would be only too happy to put him through his facings and make the Bush as interesting as they could.

Coomooboolaroc, Duaringa, Queensland, Feb. 25, 1890.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. PERRY COSTE, F.C.S.

III. — METHOD OF WORKING.

The first consideration was to ensure *absolute uniformity* in my experiments, in order that they might all be strictly comparable *inter se*. Now it seemed very evident that the effect of

reagents on the colours might well be a function, partly, of the duration of action. After a few preliminary trials, I determined to leave the colours under the action of the reagents for *one hour*, in every case. (I may add, however, that in all the cases where the most striking results were obtained, the action was very rapid, or often instantaneous; nevertheless, the time effect was apparent in many cases, and, anyhow, the safeguard was there.)

The various colours required were cut out from the wing, placed in watch-glasses and *covered* by the reagent, being left thus exposed—as already stated—for one hour. But at the very outset I was encountered by a difficulty here: “Like water off a duck’s back” is an ancient proverb, and exactly describes the way in which the liquids gathered up in spherules and rolled off the scaled wings; in fact it was impossible to wet these; and it immediately struck me how very stupid I had been in not expecting this certain result. The question then arose, how to overcome this difficulty. One obvious solution was to first touch the wing with alcohol, which of course soaks it thoroughly, and so enables watery solutions to wet it; but I was unwilling to use alcohol, except as a last resort; (for that would necessitate a complete set of blank experiments with alcohol alone; and should it be found of itself to act in any cases, the problem would become complicated). After a little consideration, I determined to try gumming the bits of wings on to a watch-glass. This answered admirably,—at least when I left them some hours to dry in; but if the reagents be applied too soon, some of the wings become detached, and swim about half-dry on the surface in the most intolerably exacerbating manner;—a “superfluity of naughtiness” on their part scarcely conducive to sweetness of temper on the experimenter’s.

It will be understood, then, that these wings were *not* merely wetted by the various reagents and then *left*, but were actually *submerged* in the reagent for *one hour*.

Recording the results.—Here I encountered another difficulty; one, too, which cannot be said to have been really overcome at all,—and this is the want of a colour standard. The natural colours of the wing are themselves not always easy to describe accurately and *uniformly*; some, of course, may be disposed of at once, as blue, yellow, green, and so on; but in very many cases it is very difficult to decide whether a colour shall be designated yellow or orange; brown, chestnut, or chocolate; and so on. As concerns this, however, I have been to great extent guided by the results, and—as will be seen—have not scrupled to divide certain colours (in what may at first sight seem a somewhat arbitrary manner) from certain others that *look* almost identical, but really are found to have a different constitution. As an example, I may refer to tabulations to be given hereafter, where the colours of

L. quercus, *M. oleracea*, *O. antiqua*, &c., are all classed as brown, in distinction to chestnut, which not only includes—naturally—the colours of *Epinephele tithonus*, *Cænonympha pamphilus*, and *Argynnis*, but also such apparently un-chestnut colours as *L. phlœas* and *V. urticæ*. The behaviour of these colours, under the influence of various reagents, demonstrates, nevertheless, that they are essentially the same as the colour of *E. tithonus*, which seems most accurately described as chestnut. So, too, it seems best to class the pink of *Smerinthus* and the ambiguous purplish reddish of *Xanthia* with the reds, since their behaviour is the same. Unfortunately, however, I am compelled to class together, under one name, all greens, although there are several differently constituted colours here, but all apparently green. Exactly a parallel case is found among the yellows; but I had no choice in such cases, since it is impossible to call a pronounced yellow or green by any other name.

By far the gravest part of this difficulty lay, however, in naming the *changed* colours. Everyone can satisfy himself at once, by a glance at his cabinet, what colour I intend when referring to the natural colour; but the only conception possible to him of the colour-change produced in my experiments must derive from my description, and I found it a very serious difficulty to name these changes with anything like clearness, distinction, accuracy, and *uniformity*. It will be readily understood that when a colour, say red (not in itself a very distinct name to start with), treated by a dozen different reagents, undergoes several different degrees of change,—each of which suggests at the moment some description, such as “reddish orange,” “orange-red,” “faded red,” “orange,” “deep yellow,” “lemon-yellow,” “pale flesh,” and so on; and then several weeks later a more or less similar red is found to change in more or less similar ways,—it is exceedingly difficult to preserve anything like uniformity in the description of the colours produced. In fact, without some kind of tintometer or colorimeter, applicable in such work, all such names must be looked upon as more or less “fluid” and approximate. Without doubt, I have on one occasion described a new colour as deep flesh, and on another as reddish orange, and so on, in numberless instances. Too rigid interpretation of the colour-names would be, therefore, inaccurate; but, nevertheless, I hope that these are sufficiently descriptive and uniform to make all my results intelligible and available. I think that the difficulty will be quickly appreciated by anyone who may try to name a few score of even natural colours uniformly, without any standard.

Reagents used.—This is a chronicle of disappointments. No one, who had not learned by experience, would imagine how stubborn and callous to powerful reagents are many—as one

would suppose unstable and delicate—insect colours; neither would he be prepared for the dolorous monotony in the changes produced by most dissimilar reagents,—when they have any effect at all. At starting, I divided my reagents into several different classes, *viz.*, “mineral acids, organic acids, alkalis, various salts, and various organic reagents,” the last two classes being of a somewhat heterogeneous character. This division turns out to be all nonsense: there are (so far as my experience goes) only two classes of reagents, *viz.*, those that destroy or alter the colours, and those that have little or no effect; and the majority belong to the latter class. I had started off with great enthusiasm, experimenting with about two dozen different reagents, and tabulating my results on separate sheets, drawn up for “mineral acid” reagents, “alkalis,” &c., respectively; but, wise from experience, I propose in future to work with only half a dozen reagents, such as have proved serviceable already.

I will now give a list of the various reagents that have been tested, first making one or two preliminary explanations for the benefit of any non-chemical readers who may possibly not understand entirely some of the expressions used. The acids (and ammonia) described as “strong,” are such as are customarily supplied for laboratory use; a 50 per cent. acid, is one of these diluted with its own bulk of water, and so on; a 50, 25, 10 per cent. solution of any salt, &c., implies that 100 cubic centimetres of the solution contain 50, 25, 10 grammes of the salt.* (In the case of the caustic hydrate solutions used, this is not strictly accurate, since in making up these the ordinary “stick” caustic was employed, and this contains a percentage of water. This fact is, however, of no importance, so long as *uniform* solutions are always used.) Many acids are solid at the ordinary temperatures, and therefore they were dissolved in water, like salts, and made up to various per cent solutions. In some instances, *saturated* solutions were made; that is, of course, as much was dissolved as the water could take up. In only two or three cases, by careless oversight, were my reagents unquantitative; but, except in one instance, such reagents were, fortunately, unimportant. All the *solutions* are aqueous, unless expressly stated otherwise.

I. † Sulphuric acid.	40 per cent. (?)
Nitric acid.	50 per cent.
‡ Hydrochloric acid.	Strong.
Hydriodic acid.	Solution of S. G., 1·500.
Phosphoric acid.	25 per cent.
Hydrofluosilicic acid.....	The usual analytical solution.
Boric acid.	Saturated alcoholic solution.

* In the metric system, 1 gramme is the weight of one cubic centimetre of distilled water at standard temperature and pressure.

† I very stupidly omitted to note the strength of this reagent.

‡ Popularly known as muriatic acid.

II. Acetic acid.....	Strong.
Oxalic acid.....	Saturated solution.
Tartaric acid.	25 per cent. solution.
Gallic acid.....	Saturated alcoholic solution.
III. Ammonia.	Strong (<i>i. e.</i> , the usual solution of the gas).
* Sodie hydrate.	25 per cent.
Ditto	10 per cent.
† Potassic hydrate.	25 per cent.
Ditto	5 per cent.
IV. † Phenol.	50 per cent. alcoholic solution.
§ Trinitrophenol.	Saturated solution.
Tannin.....	(Strength of solution unknown.)
V. Potassic cyanide.	Strong solution; exact strength not known.
Argentie nitrate.	25 per cent. solution in 50 per cent. alcohol.
Potassic permanganate	About 7 or 8 per cent., probably.
Potassic dichromate	Abandoned very quickly, as being quite useless.
Potassic iodide.	
Potassic ferro-cyanide.....	

I might add that, having originally delusively anticipated the most important results from the organic acids, I had proposed to use various others of these, such as succinic, malic, citric, benzoic, lactic, formic, &c.; but finding quickly how useless the organic acids were, I relinquished this intention.

Now, regarding the action of these various reagents, the first thing to note is that most of them are either useless or superfluous. Beginning at the bottom of the list, the salts are either quite without action, or—*e. g.*, potassic cyanide—very feebly imitative of stronger reagents, and therefore wholly superfluous. A peculiar effect produced on one or two colours by a strong solution of argentic nitrate will be referred to subsequently. In the next class (IV.), I had hoped to find some striking results; but the action, where any occurred, was simply feebly imitative again, and so superfluous. Among the *alkalis*, ammonia was somewhat disappointing. I had expected it to be by far the most active reagent of the set, but it proved often less efficacious than the others. The action of *all* these five reagents was the same, and therefore several of them are evidently superfluous. But the most surprising result was that (with, I think, one exception) the action of these alkalis was *identical with that of the acids*. By this, I do not mean that the same colour in the same insect was always affected equally by acid and by alkali, but that whenever any action followed it was always the same, and differed,

* Caustic soda.
† "Carbolic acid."

† Caustic potash.
§ "Picric acid."

if at all, only in degree or rapidity. Some colours are instantly and completely altered by certain acids, and only slightly or slowly by the alkalis (e. g., *Zygæna* and *Euchelia*, reds). In other cases, both classes of reagents are about equally efficacious (e. g., *urticæ*, chestnut); and in others, again, the alkalis are the most efficacious (e. g., the chestnut of *tithonus* and *C. pamphilus*). But the noteworthy point is that in (almost) *no* case does an alkali produce one result and an acid a different result; the action (when not *nil*) is uniformly *destructive*, producing a retrogressive colour. This appears to me a somewhat significant phenomenon, and I shall have occasion to allude to it later, when discussing the bearing of my results on the subject of natural variations. This similarity of action is somewhat surprising, from a chemical point of view. As I have already said, the similarity of action of the organic and the mineral acids was a disappointment to me; but still it is not at all surprising, for, comparing their action on vegetable colours, of course litmus is turned red by acetic acid, &c.,* as well as by the mineral acids; but that alkalis, which affect litmus, &c., diametrically oppositely to acids, should have the same effect on insect colours, is an unlooked-for result. As to the next class—of organic acids—I have already said sufficient. They are wholly useless or else superfluous; their action, when not *nil*, being simply the same as that of weak mineral acids. Lastly (or firstly!), as concerns the mineral acids, the most valuable is hydrochloric. It is simply an invaluable reagent,† and many colours are changed by it instantly. Next in value to it, is probably the diluted nitric acid. Sulphuric is rather peculiar and erratic in its behaviour sometimes; in some cases it seems to fail in getting at the colours, as it were. The 25 per cent. phosphoric acid has a feeble action, comparable with that of acetic; and the hydrofluosilicic is about the same. Boric acid is useless, or feeble. Hydriodic is also of no service; it affects some colours somewhat feebly, but with some *whites* produces apparently startling results by dyeing them a deep brown or purple; this, however, is of course in no way comparable with the results that we are here concerned with, and may at once be put aside.‡ It might, however, be interesting to reinvestigate the behaviour of all the white *Lepidoptera* when tested with either hydriodic acid or a solution of iodine, since possibly some differences of constitution might thus be detected; and I therefore intend taking an early opportunity of looking into this.§

After this *resumé*, it will hardly be denied that, as I said, the

* Not exactly the same red, however; but that is immaterial in this relation.

† There is a very peculiar *after*-phenomenon, which I must describe later, connected with the action of hydrochloric and several other acids on red colours.

‡ *Gonepteryx rhamni* was stained a magnificent purple by this reagent.

§ Since this was written the investigation referred to has been made, and the details will therefore be given in their proper connection next month.

majority of my reagents were eminently disappointing, and my original expectations altogether too jubilant. It is only by experience, however, that one can learn; and, acting on mine, I propose in my future researches to limit the number of reagents very materially. It may, perhaps, be convenient to group those that I have found of real use, stating them in order of merit, as near as may be:—

Hydrochloric acid.	Ammonia.
(Nitric acid (50 per cent.)	Sulphuric acid (25 or 50 per
(Potassic hydrate (25 per cent.)	cent.)
10 per cent. potassic hydrate.	

(To be continued.)

NEW SPECIES OF RHOPALOCERA FROM CHINA.

BY J. H. LEECH, B.A., F.L.S., &c.

THE following species are, I believe, new to Science, and were obtained last year by my collectors Messrs. Pratt and Kircheldorff, in the province of Setchuen, North-west China.

EREBIA RURICOLA, sp. n.

♂. Dark brown: central area of primaries blackish, outer third paler; a large black spot with two white pupils and faintly encircled with pale brown towards apex: there is often a white dot towards anal angle of secondaries. Under surface grey-brown: on primaries the ocellus of upper surface is reproduced, and is ringed with pale fulvous; below it is a smaller ocellus, and there is sometimes a still smaller one between them, placed on the edge of the former; below apex there is a reddish brown cloud, and there are indications of a band of the same colour between large ocellus and discal cell: the secondaries are traversed by reddish brown lines, the most conspicuous being two broad ones from middle of costa which terminate just before median nervure, and one from middle of abdominal margin to outer margin; there is a submarginal series of white dots; the outer margin and centre of the wing are also dashed with white. Expanse, 58 mm.

Four specimens taken at Ta-Chien-Lu, and two at Wa-Shan, in July.

Nearly allied to *E. saxicola*, Oberth. (Etud. d'Ent. ii. p. 32, pl. iv. fig. 1), but the white pupils of apical ocellus are placed more directly one under the other; the antennæ are pale brown, and the clubs are black beneath. On the under surface the colour of primaries is different, and there is an additional ocellus towards outer angle; the markings are more distinctly defined on the secondaries.

EREBIA RURIGENA, sp. n.

♂. Dark brown, with a slight yellowish tinge in certain lights. Primaries have a blackish cloud-like fascia from inner margin to centre of the wing; the ocellus towards apex is large, conspicuously ringed with pale

fulvous, and the lower of the two white pupils is very faint or entirely absent. Under surface brown, dusted with ochreous along costal half of primaries; the ocellus is brighter than above, both pupils are well defined, and it is followed by a reddish brown cloud extending nearly to first median nervule: secondaries ochreous-grey, clouded and dusted with darker scales, and traversed by a number of wavy brown lines, the most distinct of which are the two central and the submarginal; preceding the submarginal line is a series of white points. Fringes pale grey-brown. Expanse, 62 mm.

Several males taken at Ta-Chien-Lu, and three at Wa-Shan, in July.

Allied to *E. ruricola*, but distinguished at once by the fulvous ring of ocellus. In some specimens there is no trace of white points before submarginal line on under surface of secondaries; in others the central lines assume band-like proportions, and the submarginal line is not clearly defined.

PARARGE PRÆUSTA, sp. n.

♂. Fuliginous-brown. An angulated and interrupted fulvous band traverses the primaries from costa to outer angle; towards apex are two paler fulvous spots with a black one below them. Fringes whitish, chequered with black at extremities of nervules. Under surface:—Discal area of primaries reddish brown; fascia as above, but broader and paler; apical spots white, the black one below them is distinctly ringed with pale fulvous and has a white central dot; secondaries greyish, with some marks near the base and two transverse angulated central lines reddish brown; there is a submarginal series of six ocelli,—that on the costa is the largest and is preceded by a whitish crescent, the third is the least of the series, and the sixth has two white pupils.

♀. The fascia is broader. there is a fulvous flush in the submedian and second median interspaces, and the fringes are pale fulvous but chequered with black, as in the male; the black apical spot has a white centre. Expanse, ♂ 58 mm., ♀ 62 mm.

A very fine series, including both sexes, taken at Wa-Shan in June, and one female specimen from Huang-mu-Chung.

Closely allied to *P. episcopalis*, Oberth. (Etud. d'Ent. xi. p. 22, pl. iv. fig. 24), but the fascia on primaries is more angulated, and fulvous instead of white. The apical spots of *P. episcopalis*, when present, are white and very small. On the under surface of primaries the points of difference are as well defined as above, but colour and markings of secondaries appear to be almost exactly alike in both species.

ARGYNNIS ZENOBIA, sp. n.

♂. Fulvous with black markings, as in *A. childreni*, Gray, but the outer margin of secondaries is without the bluish tinge of that species, and the sinuses are not nearly so deep. On the under surface of primaries there is not the least tinge of red of any shade; the silvery lines at apex are sinuate and enclose three black spots, the upper one more distinct than the other two: on the secondaries there is more blue in the composition of the greenish ground colour; the basal and discal lines are very similar to these characters in *A. childreni*; the central band is sinuous and interrupted at the end of cell, where there is a large black dot; marginal and submarginal silvery lines are more indented, and towards costa the opposing angles of these lines meet

and form rings; before submarginal line is a series of black spots, each with a centre slightly paler than ground colour.

♀. Rather paler than the male; base of inner margin of all the wings suffused with greenish; there are some spots and a transverse line terminating in a large subquadrate spot in cell of secondaries.

Antennæ of the male brown, club black with fulvous apex; of the female, as in same sex of *A. childreni*. Expanse, ♂ 84 mm., ♀ 87 mm.

Two specimens of each sex, Ta-Chien-Lu, in July.

In size and in the ground colour of upper surface this species closely resembles my specimens of *A. childreni* from N.W. India, but they are much smaller and paler than specimens I have from N.W. China; these last measure, ♂ 94 mm., ♀ 110 mm.

GRAPTA GIGANTEA, sp. n.

♀. Primaries fulvous, thickly sprinkled with black scales at the base; costal margin spotted with black and yellow; discal and costal black markings arranged as in *G. c-album*, but larger; external margin broadly black, intersected by two fulvous waved transverse lines. Secondaries fulvous, thickly dusted with black scales at the base and lower half of the wing; below a large black patch on the disc is a blackish cloud extending to abdominal fold, and beyond is a broad black transverse band, the outer edge of which forms a series of points on the nervules: external margin broadly black, intersected by two fulvous lines as in primaries. Under surface ochreous-brown, marbled with pale violet-brown, and intersected by indistinct black lines; before the external margin of all the wings are two dentated black lines,—these are interrupted by the nervules, and the space between them is leaden grey; preceding these lines, on the primaries, is a series of eight dots, the third seventh and eighth with pale centres; on the disc of primaries is a silvery white spot placed on the third median nervule; the silvery white mark on secondaries is large, and in shape represents three sides of a square. Expanse, 72 mm.

One female example taken at Ta-Chien-Lu, in July, at an elevation of 7500 feet.

This species is allied to *G. c-album*, Linn., but it is much larger, and the margins are more decidedly indented. The mark on under surface of secondaries is very like the same character in some of my specimens of *G. c-album* from Japan, but in the marbling of the under surface of all the wings *G. gigantea* more nearly resembles *V. charonia*, and it also agrees with that species in having a white spot on under surface of primaries,—a character not usual in the Vanessidæ.

HELCYRA SUPERBA, sp. n.

Closely allied to *H. hemina*, Hewitson, but it differs from that species in the position and size of the black markings on upper surface. Nearly the whole of the apical half of the primaries is black, and this has its inner edge more deeply indented; the discal spots are two in number, but the larger is broadly linear. On the secondaries there are eight black spots, arranged one below the other in a transverse series; the second of these is the largest, and the first, third, fifth and sixth are often faint and sometimes entirely eliminated: the submarginal line is broad and dentate throughout from costa to anal angle. Fringes white, preceded by a narrow fuliginous grey line. Under surface shining white, apical and discal markings of primaries

faintly showing through from above: on the secondaries is a transverse series of black lunules; those in the first subcostal and second median interspaces are followed by black spots edged internally with orange. Expanse, ♂ 82—90 mm., ♀ 92—98 mm.

A splendid series taken at Chia-Kou-Ho, in July.

In a few examples there is, on the under surface of primaries, an orange-bordered black spot in the second median interspace.

SEPHISA PRINCEPS, ♀.

Apatura princeps, Fxsn. Rom. sur Lep. iii. p. 289, pl. xiii. fig. 7 a, b (1887).

Apatura cauta, Leech, Proc. Zool. Soc. 1887 (p. 417, pl. xxxv., fig. 2).

The female agrees with the male, but the wings are rather more ample. This sex has not been previously mentioned.

Among the specimens of this species lately received by me are three female examples from Chang-Yang which have nearly all the fulvous markings of the male replaced by white; the only spots of the typical colour are the two in discal cell of primaries and one on costa of secondaries, whilst below the median nervure of primaries there is a bluish longitudinal streak instead of a fulvous one. In size, shape, number, and position of the spots and dashes, this form agrees exactly with the female type, and, as the difference is one of colour only, I propose the name of *albimacula* for this variety.

APATURA PALLAS, sp. n.

♂. Blackish brown, with black, white, and pale fulvous markings. Primaries thickly sprinkled with fulvous scales on basal third, beyond which is a transverse series of four fulvous spots preceded by an irregular black band, the spot nearest the costa is darker than the others, and is followed by a large triangular black spot; there are three fulvous spots at outer extremity of discal cell, and below these a fulvous spot in each median interspace,—that in the first has a whitish centre, the other is preceded by a round black spot, before the apex there are two whitish spots (the upper one is round), the spots forming the submarginal series are fulvous, but not well defined towards costa. Secondaries:—Basal half clothed with silky grey-brown hairs, and limited by a fulvous transverse interrupted band; the inner portion of this band becomes indistinct after passing the second median nervule, but the outer, though most broken up, is continued to the first median nervule, enclosing a well-defined black spot in nervular interspace; a black band, broad towards costa and tapering to anal angle, precedes a fulvous submarginal band which is intersected by the nervules, as also is a broad fulvous line on outer margin. Fringes white between the nervules. Under surface pale olive-green; the markings of primaries are as above, but the fulvous gives place to white or whitish, and the black spot in second median interspace is encircled with fulvous: secondaries pale olive-green; basal area washed with greyish, and bounded by an olive-brown transverse tapering band; from the inner edge of this band, which is broadly bordered with silvery white, a spur runs inwards and upwards above the median nervure; there is a well-defined ocellus on the second median interspace, and above it is a series of silvery white spots, the interrupted submarginal band is of the same colour, as also a fainter line which traverses the pale olive-brown outer margin. Expanse, 39 mm.

One male specimen taken at Chia-Kou-Ho, in July, at an elevation of 1700 feet.

On the upper surface this species is not unlike *A. iris* var. *bieti*, Oberth. (Etud. d'Ent. xi. p. 18, pl. iii. fig. 15), but the fulvous spots are much paler, and the black spot on primaries is not ocellated and is less conspicuous; the fascia on secondaries is narrower, and has the inner edge curved, and there is no purple reflection on these wings. On the under surface *A. pallas* is quite unlike any species of the genus with which I am acquainted, but bears a superficial resemblance to *Argynnis paphia*.

THECLA CÆLESTIS, sp. n.

♂. Bright blue. Primaries with broad black band on outer margins, the apical portion extending nearly to middle of the costa; from this point to the base the costa is edged with black. Secondaries:—Two black spots just above anal angle (one on each side of submedian nervule); the ante marginal band is black and fairly broad at apex, and this colour is continued half-way up the whitish abdominal margin. Fringes greyish, preceded by a black line on the secondaries; tail black, tipped with white. Under surface russet-brown; on the primaries there is an indistinct discal spot, and beyond it an oblique silvery white line extending from costa to first median branch; submarginal line bluish white, ill-defined towards apex, and edged internally with black towards the inner margin, which is broadly grey: secondaries have a silvery white central transverse line and a bluish white sinuous submarginal line; the latter is edged internally with blackish, and the former is twice angulated above the anal angle and terminates about the middle of abdominal margin; anal angle is black, and above it is a broad orange-red patch extending from first median nervule to end of central line on abdominal margin; the black spots are reproduced, but that nearest the anal angle has a blue centre; fringes as above, but the black line at their base is preceded by a bluish one towards anal angle.

♀. Similar to the male, but the black band of primaries is much broader, and contains an orange patch, which is bisected by the second median nervule; the costa and fringes are tinged with fulvous; the marginal band of secondaries is also broader. Expanse, 42 mm.

A very fine series taken at Ta-Chien-Lu, in July.

In the male the marginal band of secondaries varies in width; in some specimens it is only represented by the costal portion. One example has this band broader than the female, whilst the black on primaries is of the same width as in the female.

APORIA PROCRIS, sp. n.

♀. Yellowish white, with the neuration black and conspicuous; submarginal line of primaries dentate, extending to first median nervule: on the secondaries there are indications of bifurcated streaks between the nervules. Under surface of primaries whitish, costa and apex yellowish; secondaries yellow, with a patch of orange at base; neuration and lines as above. Expanse, 25 mm.

One example, Ta-Chien-Lu, in July.

Allied to *A. saracta*, Moore, but differs therefrom in colour and in the absence of black patch beyond discal cell. It is perhaps most readily distinguished by the black neuration.

PIERIS LOTIS, sp. n.

Black with white markings; these on the primaries are very similar to *P. larraldei* (Oberth. Etud. d'Entom. ii. p. 19, pl. 1, fig. 2a, b); the basal two-thirds of secondaries are white, with a broad patch of black scales at the base and extending along the median nervure; there are no white or whitish submarginal spots on either primaries or secondaries, but the latter have a series of more or less lunulated spots on the outer margin. Under surface of primaries also similar to *P. larraldei* as regards the white markings, but the costa and apical third are pale yellowish; the latter is intersected by the black nervules and some thin black bifurcated streaks between them; secondaries are pale yellowish; neuration black, a bifurcated black streak in each nervular interspace. As in the same sex of *P. larraldei*, the female has the white markings suffused with greenish yellow. Expanse, ♂ 74 mm., ♀ 78 mm.

Four male specimens taken in a marsh near Wa-shan, June; and two examples of each sex, Ta-Chien-Lu, July.

PIERIS CISSEIS, sp. n.

♂. White; apex of primaries broadly black; at the outer extremity of discal cell is an elongate black spot, and towards external margin of the wing are two black spots,—the upper one is the largest, and is connected by some scattered black scales with the apical bands. Under surface:—The black spots of primaries are reproduced, but the apex and costa are yellowish; secondaries clear pale yellow. Expanse, 76 mm.

One specimen taken by a native collector at Chang-Yang.

This species resembles the female of *P. brassicæ*, but the black discal spot at once distinguishes it. The secondaries are without darker scales on the under surface.

PAPILIO SCIRON, sp. n.

♂. Velvety brownish black, base of primaries sprinkled with yellowish scales, markings of all the wings bright orange-yellow; these on primaries comprise a broad central fascia, a blotch on costa at the extremity of cell, a central row of four spots, and a submarginal series of spots; the secondaries have a central fascia and submarginal row of spots, margins of anal angle tinged with chestnut, and above it is a short streak of bluish grey scales.

♀. Agrees with male, but the markings are rather paler. Under surface:—Basal third of all the wings rich chocolate-brown, central third yellowish white, and outer third fuscous with paler interrupted submarginal band; there is a patch of chocolate-brown at the extremity of discal cell on all the wings, and one at anal angle of secondaries. Expanse, ♂ 102 mm., ♀ 116 mm.

Four specimens of each sex from Chia-Kou-Ho, July; two from Huang-mu-Chung, August.

Allied to *P. gyas*, Westw., from Sikkim (Arc. Ent. i. pl. 11, fig. 1, 1841).

DESCRIPTIONS OF NEW SPECIES OF PHYTOPHAGOUS
COLEOPTERA RECEIVED BY MR. J. H. LEECH, FROM
CHANG-YANG, CHINA.

BY MARTIN JACOBY, F.E.S.

(Continued from p. 167.)

CNEORANE RUFIPES, *Weise*. (Pl. II., fig. 11.)

Numerous specimens answering to the description given by the author were obtained, all differing from *C. elegans*, Baly, by the entirely rufous legs. So many closely allied species of *Cneorane* have lately been described by Fairmaire and Allard, that it is almost impossible to determine any species with certainty without comparing the types; and there can be little doubt that many of them are either identical or varieties, as the insects seem subject to great variation in size, sculpture, and colour. It is to be regretted that new species are continually described without consulting specialists as to their opinion of their specific distinction, since short descriptions can give but little assistance in the determination of these closely-allied forms. *C. de la touchi*, Fairm., seems certainly identical with *C. femoralis*, Jac.

EUSTETHA NIGROPUNCTATA, *Fairm.* (Pl. II., fig. 4.)

I must refer, although somewhat doubtfully, the specimens obtained by Mr. Pratt to this species. Fairmaire seems to have forgotten to mention the colour of the elytra and of the abdomen, which is flavous; the former have five black spots each,—one at the shoulder, two placed transversely near the middle and of small size, and two larger ones (one before, the other at the extreme apex). It is obvious that the elytra cannot be black (according to the description) with black spots, but curious that the colour of the abdomen should have been overlooked as well by the author. I think in regard to this genus, that it might very well be united with *Galerucida*, with which it has all structural characters in common; this is also the opinion of Herr Weise.

EUSTETHA THORACICA, *Jac.*

Of this species a few specimens were obtained, which differ from the type in having an unspotted thorax, but in no other way; these specimens all belong to the fulvous variety, the type having dark bluish elytra. *E. thoracica* has an entirely smooth and impunctate thorax.

SPHNENORAIA CUPREATA, n. sp.

Below fulvo-piceous, above metallic dark cupreous; thorax sparingly punctured, with a deep depression at each side; elytra finely punctured, semipunctate-striate; abdomen obscure fulvous. Length, $1\frac{1}{2}$ —2 lines.

Ovate, slightly widened posteriorly; head impunctate, with a deep fovea between the eyes; antennæ about half the length of the body, the second and third joints very small and equal, the intermediate ones compressed. Thorax twice as broad as long, the sides nearly straight, the anterior angles thickened and prominent, the surface with a deep but short transverse depression at each side, finely and sparingly punctured; elytra with a longitudinal groove within the shoulders, as finely punctured as the thorax, except within the humeral depression, where the punctures are stronger, the punctuation arranged in rather regular rows; abdomen more or less fulvous.

This species resembles somewhat *S. fulgida*, Redt., in its metallic cupreous colour, but is very much smaller, and is distinct by the fine punctuation of the thorax and the elytra; the colour of the upper side is a dull reddish cupreous, that of the head is more bluish.

Two specimens.

LEPTARTHRA INTERMEDIA, n. sp. (Pl. I., fig. 12.)

Oblong-ovate, dilated posteriorly, metallic blue or violaceous; thorax with transverse and longitudinal depressions; elytra pale fulvous, finely punctured with semi-regular double rows of larger punctures; abdomen pale fulvous. Length, 5—6 lines.

Closely allied to *L. dohrni*, Baly (*Merista rufipennis*, Harold), but quite distinct; much smaller, and less convex and dilated; the first three joints of the antennæ metallic blue, the rest black, extending to more than half the length of the body; thorax scarcely perceptibly punctured, metallic blue or violaceous, the sides with a deep transverse depression, the middle of the disc with a longitudinal groove, which assumes the shape of a fovea near the base; scutellum dark blue; elytra dilated, with a very faint depression below the base, the surface finely and closely punctured, with more regular rows of larger punctures partly arranged in pairs near the suture.

The punctuation of the elytra in *L. intermedia*, of which three specimens are before me, will at once distinguish this species from *L. dohrni*, in which the elytra are finely and evenly punctured throughout, and have also a deep transverse depression below the base, besides being very strongly widened posteriorly; all other characters are very similar in both species. *L. abdominalis*, Baly, has the elytra strongly and irregularly punctured.

LEPTARTHRA GRANDIPENNIS, Fairm.

This species seems to me to be identical with *L. dohrni*, Baly.

TAPHINELLA LONGICORNIS, n. sp.

Black, the head, thorax, and legs pale fulvous; antennæ as long as the body; thorax finely punctured, transverse; elytra black, finely punctured. Length, $1\frac{1}{2}$ line.

Head with a few, extremely minute punctures; eyes large and prominent, the frontal elevations broadly trigonate, nearly contiguous, bounded behind by a deep transverse groove; palpi slender; antennæ as long as the body, slender, the third joint smaller than the second, both very small, the others elongate, nearly equal, the three basal and the terminal one fulvous, the rest black: thorax transverse, the sides nearly straight, the anterior angles oblique, thickened, the surface with an obsolete depression at each side, finely and sparingly punctured; elytra black or piceous, finely but not

very closely punctured; tibiæ unarmed, the first joint of the posterior tarsi much longer than the following joints together; anterior coxal cavities closed.

This species exhibits all the structural characters (with the exception of the filiform antennæ) of the genus *Taphinella*, described by myself in the 'Annals of the Genoa Museum,' 1889. The very small second and third joints of the antennæ in connection with the transverse thorax, long metatarsus of the posterior legs, and the closed cavities, are the principal characteristics of the genus. *T. longicornis* almost entirely resembles *T. nigripennis*, Jac., in coloration, but differs in the black under side, the filiform antennæ, and the much smaller size; this difference in the structure of the antennæ (which in the type have their intermediate joints dilated) is, I think, not sufficient to separate the present insect generically.

A few specimens.

BRACHYPHORA, n. gen. (GALERUCINÆ.)

Narrowly elongate; antennæ filiform, their joints gradually lengthened; thorax transverse, the sides nearly straight, the surface obsoletely impressed at the sides; elytra irregularly punctured, their epipleuræ continued below the middle; legs slender; the four anterior tibiæ armed with a small spine, the posterior ones unarmed; the first joint of the posterior tarsi as long as the three following joints together; claws appendiculate; anterior coxal cavities closed.

The insect, for which I propose the present genus, and which I am unable to place satisfactorily in any of the numerous genera of *Galerucidæ*, has the general appearance of a species of *Luperus*; the closed anterior cavities and the prolonged elytral epipleuræ would place *Brachyphora* near *Zermyla*, but the general shape of the insect and the unarmed posterior tibiæ separate the present genus from that and other genera.

Type. *Brachyphora nigrovittata*.

BRACHYPHORA NIGROVITTATA, n. sp. (Pl. II., fig. 12.)

Fulvous; the terminal joints of the antennæ and the abdomen black; head and thorax finely punctured; elytra very distinctly and closely punctured, flavous, the sutural and lateral margins black. Length, 2 lines.

Head broader than long, the vertex with a few very minute punctures, fulvous, the frontal elevations not very strongly raised, broad and transverse, clypeus strongly swollen and triangular, the penultimate joint of the palpi scarcely incrassate, the terminal one acutely pointed; antennæ about half the length of the body, the five lower joints fulvous, the others black, the first joint as long as the fourth, the second one but slightly smaller than the third, the fourth and following joint very slightly increasing in length. Thorax about twice as broad as long, the sides scarcely perceptibly rounded, the angles not produced, but in shape of a very small tubercle, the surface with a very obsolete small depression at the sides, finely and rather closely punctured, the interstices extremely minutely granulate; scutellum rather broad, trigonate; elytra flavous, more strongly punctured than the thorax, the punctures closely arranged and distinct to the apex, the interstices slightly raised, a sutural broader stripe (suddenly and strongly narrowed

near the apex) and another more narrow one at the lateral margin, extending to the epipleuræ and to the apical angle, black; the breast and legs fulvous, abdomen black; prosternum invisible between the coxæ.

Many specimens.

ANTIPHA NIGROFASCIATA, n. sp. (Pl. II., fig. 6.)

Fulvous; antennæ (the basal joints excepted) and the tibiæ black; thorax transverse, strongly punctured; elytra flavous, strongly and semi-regularly punctured, the sutural and lateral margins, and a transverse narrow band below the middle, black.

Var. The elytral bands nearly obsolete, or fulvous.

Mas. The second and third joints of the antennæ extremely small.

Fem. The third joint of the antennæ longer than the second.

♂. Ovate, convex, scarcely widened behind; the head fulvous, impunctate, deeply foveolate between the eyes, the frontal tubercles narrowly oblique, the clypeus broadly triangular; antennæ extending beyond half the length of the elytra, black, the lower three joints fulvous, the second very small, the third still smaller, the following joints slender, elongate; thorax more than twice as broad as long, the sides slightly rounded, the angles in shape of small tubercles, each furnished with a single hair, the surface fulvous, distinctly but not very closely punctured; scutellum fulvous; elytra flavous, more strongly punctured than the thorax, the punctures arranged in close and rather regular rows, the sutural and lateral margins (including a larger spot on the shoulders), and an oblique narrow band below the middle, black; under side and the femora fulvous; tibiæ and tarsi black; prosternum narrow, but distinct; anterior coxal cavities closed.

The female, in which the elytra show a slight transverse depression below the base, has the third joint of the antennæ nearly three times as long as the second, but does not differ in any other way. In the variety, the elytral markings are obscure fulvous, or sometimes scarcely perceptible.

Many specimens of the type and of the variety.

ANTIPHA BIPARTITA, n. sp. (Pl. II., fig. 5.)

Fulvous; the head, antennæ (the basal joints excepted), thorax, and the tibiæ, black; thorax remotely punctured; elytra strongly semipunctate-striate, dark fulvous, the posterior portion black. Length, $2\frac{1}{2}$ —3 lines.

Var. Elytra entirely fulvous.

♂. Head impunctate, black, the middle impressed with a deep fovea; antennæ nearly as long as the body, the second and third joints very small, the fourth as long as the three preceding joints together, the lower three joints fulvous, the rest black; thorax twice as broad as long, the sides slightly narrowed towards the base, the anterior angles prominent, the surface rather sparingly punctured, a little more closely at the sides, the latter with a small depression; scutellum fulvous; elytra very strongly and closely punctured, the punctures semi-regularly arranged in rows, the apical portion more or less black, the rest fulvous; under side and legs, with the exception of the tibiæ and tarsi, fulvous.

This species, of which many specimens are before me, is subject to variation in regard to colour, the head and thorax being sometimes stained with fulvous, while the elytra in some specimens are entirely of that colour. The female, like the preceding species, has a much longer third joint of the antennæ.

ANTIPHA(?) ELONGATA, n. sp.

Elongate, black, the base of the head and the thorax fulvous; antennæ slender, black; elytra flavous, closely and rather strongly punctured, the extreme sutural margin black; prosternum very narrow, but distinct. Length, 3 lines.

Mas. The second and third joints of the antennæ very short.

Fem. The third joint twice as long as the second one.

Var. a. The head and thorax black.

Var. b. Head and thorax fulvous.

Of elongate, posteriorly slightly widened shape; the head not longer than broad, the vertex fulvous, the lower portion black, eyes large and prominent, the intermediate space impressed with a deep fovea, clypeus strongly raised into a triangular ridge; labrum broad, obscure piceous; palpi not much thickened, the terminal joint acute; antennæ rather closely approached, black, two-thirds the length of the body, the second and third joints in the male extremely short, the third one rather shorter than the second, both moniliform, the fourth longer than the three preceding ones together; thorax transverse, twice as broad as long, the sides scarcely rounded, the anterior angles acute and prominent, the surface obsoletely depressed near the base, nearly impunctate, fulvous; scutellum piceous, trigonate, broad; elytra flavous, rather strongly and very closely punctured, their epipleuræ extending to the apex; under side and legs black, the latter slender, the tibiæ unarmed, the first joint of the posterior tarsi as long as the following joints together; claws appendiculate; anterior costal cavities closed.

In shape and the structure of the antennæ, this species differs a good deal from most of its congeners; but as the principal characters peculiar to *Antipha* (the distinct prosternum, the unarmed tibiæ, and the shape of the thorax) are present, I have included the species in that genus; the very short third joint is peculiar to the male insect only. In one specimen the entire head and the scutellum are fulvous; in another, the head and the thorax are black, and the anterior angles of the latter are not prominent; but as I cannot see any other difference whatever, I have preferred to look upon this specimen as a variety.

Two specimens.

(To be concluded.)

THE LATE JOSEPH SUGAR BALY.

At the meeting of the Entomological Society, on April 2nd, the President alluded to the decease of one,—who had been for many years a member of the Society, and had published much in its 'Transactions,'—Mr. J. S. Baly, who died at Warwick, on March 25th, 1890, aged seventy-three years. The leading features in Mr. Baly's career have been sketched in one of the local papers in an article, from which we make the following extract:—

"His illness only commenced on Wednesday in last week, but he became rapidly worse, and ultimately succumbed to an attack

of jaundice. He died in harness, being fully engaged with his official duties as long as he was able to go about. He was a member of an old Warwick family, being the eldest son of the late Mr. Joseph Baly. His only brother, Mr. Price Richard Baly, was a pupil of Brunel, the engineer, and was extensively engaged in the construction of railways in Brussels, Russia, and the Caspian, until he retired about fifteen years ago. Mr. J. S. Baly, born at Warwick in 1816, and educated at the Grammar School, under the Rev. George Innes, was a student of St. George's Hospital, Hyde Park (at that time the leading hospital); and when he passed his examination there, he received 'the compliments of the court.' He was also, during his earlier years, a pupil at the Shrewsbury infirmary, under Dr. Burd. After gaining his diploma, he pursued his studies in Paris. He settled down for a time in Leamington, and held the appointment of medical officer of the Union for that district. But his scientific tastes attracted him to London, where he secured a very large practice, and formed the friendship of many of the scientific men of the day, including several of the chiefs at the British Museum. He came to be acknowledged as a leading authority on Coleoptera (the beetle family); and a portion of his unique collection, which was of world-wide reputation, was purchased for the British Museum with a large sum of money. He was Fellow of the Linnean and of the Entomological Societies, and a member of all the foreign Entomological Societies, by whom he was constantly applied to for his wide experience in his favourite study. The books he has published on the Coleoptera generally, and especially the family of Phytophaga, to which he gave his chief study, are valuable as the accepted authority in this particular branch. He was hard at work on his favourite pursuit to the time of his death, naming and describing collections sent from foreign Entomological Societies, and preparing a paper, which he has not been permitted to finish. His health first broke down from over-work in London, and he was compelled to give up a large and lucrative practice. He came back to his native town twenty-two years ago, and held the appointments of medical officer of health for Leamington, and also medical officer for the Union Infirmary. These offices gave him ample time for the indulgence of his scientific tastes, and he was one of the hon. curators of the Warwick Museum. He was a man of very extensive research, and his great natural ability would have entitled him to have claimed a far higher position in the medical world than that which he occupied. But his retiring and studious disposition prevented him from reaping the full reward of his merits. Immersed in his favourite pursuits, which he followed with remarkable patience and devotion, he realised the modest ambition of his life, with a full knowledge that his worth was acknowledged by men of the highest scientific eminence, who

will mourn his loss as a colleague and a friend. The deceased gentleman leaves behind him a widow, one son (Mr. Price Baly), and five daughters."

The above information is, we believe, correct, except in one or two minor entomological points, and we are able to add some details about Mr. Baly as an entomologist.

He was not a field-collector, and seems to have paid little or no attention to Entomology till he was approaching middle life. After he commenced medical practice, he was much interested in microscopic work, and possessed what was at that time a splendid instrument, fully provided with all the apparatus for the investigation of opaque objects, and he was expert in its manipulation. This it was that led to his becoming an entomologist. About the year 1850 he visited Mr. S. Stevens, in Bloomsbury Street, in search of objects for his microscope, and he purchased a small collection of Indian Hymenoptera. He entered into a correspondence with Mr. H. W. Bates, who was then in the Amazon Valley, and in the course of this informed Mr. Bates that the marvels of insect-structure revealed by his microscope led him to devote himself more exclusively to Entomology. At that time the collections made by Wallace in the Malay Archipelago and by Bates in the Amazon Valley were arriving in this country, and Baly having a series of the phytophagous Coleoptera from them, found full occupation for his leisure time in the examination and description of the crowd of novelties contained in these and other acquisitions. There was in the Phytophaga, alone, more than work for one man, and Baly appears to have endeavoured to do this work, so far as it was in his power. He was a patient and enthusiastic entomological worker; and when in practice in the suburbs of London, and called to see a patient in the small hours, he would on his return home spend the remainder of the night in his study, instead of going to sleep.

He joined the Entomological Society of London in the year 1850, and he also became a member of the Entomological Club. His writings on Phytophaga are known throughout the world, and he described an enormous number of new species of the group. At the time he commenced amassing a collection, little was known of the Entomology of the tropics; and it is probable that neither he nor anyone else realised the enormous number of species that would have to be dealt with. As these continued to arrive, in apparently ever-increasing numbers, an ordinary man would have been dismayed, and might have abandoned the task he had undertaken as being hopeless of accomplishment; but Baly worked on quietly and steadily, and has, undoubtedly, accomplished much.

Many years ago, Mr. Baly disposed of his collection of Cassididæ to Mr. E. W. Janson; and about the same time, or subsequently, the Sagridæ, Chrysomelidæ, Eumolpidæ, and

other groups, including the Halticidæ, were purchased for the National collection in the British Museum; and the Hispidæ subsequently became part of the entomological property of the nation. After parting with these portions of his earlier collections, Baly chiefly worked at the Galerucidæ, and has left a large collection of these insects in the possession of his family at Warwick.—D. S.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

THE CHEMISTRY OF INSECT COLOURS.—I need hardly say that I am quite delighted that Mr. Coste has taken up this subject, and I wish him all success. If the facts prove in any cases contrary to my hypotheses, so much the worse for the hypotheses; and certainly I desire to get at nothing but the truth. With regard to my statements quoted (Entom. 129), I believe it is true that the white of several Lepidoptera may be turned yellow by a caustic alkali; at all events, *Melanargia* and *Lycana* spp. But the best account of this is the original one of Mr. Coverdale's (Entom. xvii. 204). I believe I was quite accurate, also, about the *Colias* being turned red by cyanide, and I beg Mr. Coste to experiment again with the cyanide in a closed heated bottle. At a meeting of the Brooklyn Entomological Society, October 6th, 1885 (Ent. Amer. I., 159), Mr. Hy. Edwards exhibited a *Colias eurydice* thus turned red. On a similar effect produced on Hymenoptera, see R. H. Stretch, 'Canadian Entomologist,' 1886, pp. 55, 56. There is one way in which Mr. Coste's difficulty about the effect of the damp cyanide bottle on *Colias* may possibly receive an explanation, namely, that the red colour was produced by an *impurity* in the cyanide, perhaps some ammoniacal compound. Mr. Geo. Gore ("Electro-Metallurgy") says that, according to Messrs. Glassford and Napier, commercial white cyanide of potassium generally contains about 35 per cent., and often as much as 50 per cent., of impurities, in the form of carbonate and sulphate of potash, chloride of potassium, cyanate of potash, ferrocyanide of potassium, and silica; and if the mixture of salts from which it is made is not dry, ammoniacal compounds are also formed. Thorpe and Fresenius refer also to potassium sulphide as an impurity. Mr. Coste, in regarding himself as practically alone in his new line of research, has apparently overlooked the excellent investigations of Mr. F. Gowland Hopkins, recorded in the 'Chemical News,' August 2nd, 1889, p. 57; and also the researches of A. Bergé, 'Compt. rend. Soc. Entom. Belg.,' November, 1885.—T. D. A. COCKERELL; West Cliff, Colorado, April 18, 1890.

THE SALLOW SEASON OF 1890.—Sallows were in full bloom as early as the middle of February in the South-west of England (Entom. 136), but at the time when florescence of the *Salix* was more general, the nightly meteorological conditions were not altogether favourable. It was thought, therefore, advisable to ascertain if the usual lepidopterous visitors to the sign of "The Catkin" were less numerous than in other years; and with this object in view, some thirty entomologists, residing in various parts of Britain, were invited to report their experience at "sallows" this season. The majority of the gentlemen written to were courteous enough to reply; some, only to say that they had not attempted work at sallows this year;

others, who had interviewed the revellers at the aforesaid hostelry, give the following accounts of the state of affairs in their respective districts:—

Portsmouth.—Mr. T. H. Larcom gives me the following account of his work at the shallows this season. I was, unfortunately, too busy to visit them myself. March 11th: At Alder Marsh, near Gosport, *Tæniocampa cruda*, one; *Hybernia marginaria* (*progemmaria*), common. March 14th: In the Forest of Bere, near Barn Green, *T. cruda*, abundant; *T. gothica*, common; *Cerastis vaccinii*, *C. spadicea*, *Gonepteryx libatrix*, and *Scopelosoma satellitia*, common. The willow (one bush only) was crowded; a sheet was obtained and the insects shaken into it, and taken into the house to be examined; a strong and cold north-east wind was blowing at the time. On March 15th, at the same place, a specimen of *Nyssia hispidaria* was found on a trunk by Mr. Larcom; this is the first record of this insect in this district that I have met with. March 26th: In company with two members of the P. and G. Natural Science Society, at Alder Marsh, *T. gothica*, common; *T. stabilis*, two; *T. instabilis*, one; *T. rubricosa*, one. April 10th: In the Forest of Bere, *Anticlea badiata*, one, on willow; *H. marginaria* var. *fuscata*, one male.—W. T. PEARCE; 111, High Street, Gosport.

Bristol.—Owing to illness, I did not begin night-collecting till the 26th of March, when I found some of the willow-blossoms already partially over, but a good deal of it was in full blossom. Common moths were certainly abundant enough. *Tæniocampa stabilis*, *T. gothica*, and *T. cruda* were in profusion, especially the last-named; and *T. munda* much commoner than it usually is here. *T. instabilis* was rather scarce, *Pachnobia rubricosa* not rare; these, and hibernated specimens of *Orthosia vaccinii*, were the only Noctuæ I met with on this and the two succeeding nights. The same species came to sugar on the 29th of March, with the exception of *P. rubricosa*. As to Geometræ, I took a few specimens of *Eupithecia abbreviata*; *Larentia multistrigaria* and *Anticlea badiata* were common. Though not directly connected with willows, I may mention that I met with *L. multistrigaria*, as early as February 17th, at light; and until quite recently have been taking wasted specimens of *A. badiata*. From the appearance of some of the moths on March 26th, I should imagine that they had been out some time; I know that willow was in bloom here on the 12th March. I shortly after left this neighbourhood for a few weeks, and since my return here have met with specimens of *Tæniocampa cruda*, *T. gothica*, and *Pachnobia rubricosa* at light; yesterday evening (19th) seeing a specimen of *T. stabilis* on a gas-lamp.—R. M. PRIDEAUX; 9, Vyvyan Terrace, Clifton, Bristol, May 20, 1890.

Devon.—The willows in Devon were in bloom so early this year that, to me, they were useless. I was quite unable to be out at dusk. The few that blossomed as late as April were not attractive to moths. All I took were a few specimens each of *T. gothica* and *T. rubricosa*. Last year the list was *T. gothica*, *T. rubricosa*, *T. gracilis*, *T. munda*, and *T. cruda*. *D. rubiginea* has not yet fallen to my lot.—M. CRASKE; Newacott, Bridgerule, Holsworthy, Devon.

Chester.—I consider 1890 as one of the most disappointing years for willow-work that I can remember. In the Chester district the catkins were well open, in sheltered spots, on the 15th of March. At night I examined the flowers, first with the aid of a lamp, and then by beating the higher branches, whilst an inverted umbrella was held beneath. My captures,

arranged according to frequency, were *Tæniocampa gothica*, *T. stabilis*, *T. incerta* (many forms being almost as grey as *T. populeti*), and *T. pulverulenta* (*cruda*). This was my most successful night with the Tæniocampidæ, for cold east and north-east breezes set in, and lasted, with little intermission, till April 21st, when the catkins were over. Star- and moon-light also unusually clashed with the sallows, and materially aided in keeping the moths "at home." I did not see *T. gracilis* at all, or, I might add, *Triphosa dubitata*, which usually shows itself on the willow-bloom, with a brilliancy and gloss certainly not suggestive of a hibernated insect. On the night of March 28th, *Anticlea badiata* was unusually abundant with us; and *Cidaria suffumata*, another catkin Geometer, appeared in force on April 18th. Larvæ, probably of *Xanthia fulvago* (*cerago*), have been common this season. I usually got one or two in the changing the catkins I used as food for larvæ of *Agrotis ashworthii*.—J. ARKLE; Chester.

Rotherham.—As there are no willows within ten miles of this place, I have not been able to devote more than one night to them this season. The following insects were observed at the catkins:—*Scopelosoma satellitia*, *Cerastis vaccinii*, *Tæniocampa cruda*, *T. gothica*, *T. instabilis*, *T. stabilis*, these were very abundant; *T. rubricosa*, *T. munda*, *T. populeti*, fairly so; and of *Pachnobia leucographa*, four or five were taken. A few trees sugared in the neighbourhood of the willows were visited by *T. munda*, *T. stabilis*, *S. satellitia*, and *C. vaccinii*.—J. N. YOUNG; 85, Fitzwilliam Road, Rotherham.

North Wales.—I have worked willows on four evenings this spring; the captures were as follows:—March 27th and 28th: two very favourable evenings, *T. gothica* was abundant, *T. stabilis* and *C. vaccinii* fairly so; I also took a few *T. pulverulenta*, two *T. munda*, and two *T. gracilis*. April 6th: I did not get out till after midnight, when I found two *T. gracilis*, one *T. dubitata*; with *gothica*, *stabilis*, and *vaccinii*, as before. The above were captured near Ruthin. I spent the remainder of April at Bolton, Lancashire. East winds prevailed till the end of the month. April 29th was a favourable evening, although the willows were very nearly over; I took about two dozen *P. rubricosa*, and a few *T. gothica*.—J. E. R. ALLEN; Ruthin, North Wales.

Aberdeen.—So far as my experience goes, this appears to be a poor district for early moths. My captures at the willows in April were:—*Pachnobia rubricosa*, *Tæniocampa gothica*, *Cerastis vaccinii*, and *Calocampa exoleta*. *Larentia multistrigaria*, *Cidaria suffumata*, *Diurnea fagella*, were common, but did not occur at the willows.—L. G. ESSON; 6, Stafford Street, Aberdeen, N.B.

HYPsipETES SORDIDATA.—Mr. South, in reference to *Hypsipetes elutata*, writes (Entom. 170) of "the willow and bilberry forms." I assume the Editor to be exact in his terms, but has he been explicit enough in his paragraph? He speaks of "the smaller specimens, whose larvæ feed on bilberry," and of "the large willow-feeding specimens"; and he asks his readers to make certain observations. But, surely, when collecting *elutata* in a district where both willow and bilberry occur, one is not to put down all the small specimens as the "bilberry form," and the large specimens as "the willow form." I collect *elutata* in a locality where both willow and bilberry occur, but could make no useful observation as to whether one "form" has passed its "zenith" before the other, if size alone is to be the criterion. If there be any other mode of differentiating these forms, I should be grateful

for a further description of the "bilberry form," as I must confess my ignorance of it.—A. B. FARN; Fairlawn, Stone, Greenhithe.

I have not particularly noticed the difference in the times of emergence between the bilberry and sallow forms of *Hypsipetes sordidata* (= *elutata*), as they do not vary very much here, except on the moorlands, where almost everything is later in its appearance. The most curious thing about this species here is that sallow nearly always produces the perfectly black variety, *infuscata*; and bilberry, especially on the moors, beautifully marked varieties. In a wood close by, in which no bilberry occurs, I annually take a goodly number of larvæ, which always produce the black form, and never any other. I hope this year to have larvæ both from bilberry and sallow, both from the moors and woods, and will pay attention to Mr. South's observations (Entom. 170).—A. E. HALL; Norbury, Sheffield, May, 1890.

HEPIALUS LUPULINUS IN AUGUST.—On the 1st of August last, I took a specimen of *Hepialus lupulinus* at Lyndhurst, Hants; and another specimen of the same insect on the 17th of August at Broadstairs, Kent. Are not these dates very late for this species? The authorities give May and June as the months for its appearance. I may add that both insects were in good condition.—H. A. HILL; 132, Haverstock Hill, N.W., May 4, 1890.

SPILONOTA PAUPERANA.—I had the pleasure of taking a pair of this insect on the 23rd April; from their condition I should say they had recently emerged. I believe it is more than twenty years since this species has been taken in the London district, and I know of none from elsewhere. I beat them from rose, and I am sorry to say I failed to take more. *S. pauperana* is evidently a very sluggish insect, as they made no attempt to fly when beaten out. The locality is not open to the public, which must be my excuse for not mentioning it. It is in the neighbourhood of the south of London.—C. FENN; Evenden House, Burnt Ash Hill, Lee.

DEILEPHILA LIVORNICA NEAR MANCHESTER.—I have recently added to my collection a fine specimen of *D. livornica* (*lineata*), kindly given to me by Mr. Herbert Massey, who took the moth at rest in his garden in Burnage, near Manchester, on June 15th, 1878. The rarity of the insect, together with the fact of not recollecting any other record of its having been taken in this locality, must be my apology for mentioning a capture made twelve years ago.—B. H. CRABTREE; The Acacias, Levenshulme, Manchester. [The capture of four other specimens in 1878 will be found recorded as follows:—Knutsford, June 11th, Ent. Mo. Mag. xv. 72; Glamorganshire, August, Entom. xi. 190; near Morpeth, August 18th, Entom. xii. 18; near Hartlepool, July, Entom. xii. 19.—ED.]

THE PUPÆ OF *HYBOCAMPA MILHAUSERI* AND *CERURA*.—When I wrote my note on *H. milhauseri* (Entom. 91), I was under the impression that the pupa of *Cerura* was always rounded and dome-shaped in front, and though I have no note on the subject, I believe as regards the British species this impression is correct, and this is confirmed by an examination of the pupa of *bicuspis*, the only British species of which I happen to have a living pupa, and which is smoothly rounded in front; but on examining a pupa of *multiscripta*, a North-American species, I find that it has a keeled projection in front, that is a very fair rough blocking out of the special structure of *milhauseri*. From the oral region there originates a ridge reaching forwards, then at a right

angle it proceeds backwards, merging again in the general surface at the extreme top of the pupa; on either side of this ridge is a slight hollow. The angular point of the ridge is rough and rounded, and is quite unsuited for such use as that of *milhauseri*; but there would appear reason to believe that this is really a rudimentary form of the "sardine-opener" of that species, and very possibly it has some use in more accurately directing the action of the cocoon-softening fluid; the cocoon contains wood-chips, just as those of our own *Ceruras* do. I must leave it to American entomologists, if they have not already done so, to define the function of this process, unless some one will generously send me a supply of cocoons, when I will do my best to make the observation.—T. A. CHAPMAN; Firkbank, Hereford.

FOOD-PLANT OF *PLUSIA INTERROGATIONIS*.—The larva of *P. interrogationis* has never been found feeding on the nettles here; they are always found on heather. It seems that some entomologists do not know the proper food-plant of this species, so I thought I would make it known.—L. G. ESSON; 6, Stafford Street, Aberdeen, N.B.

[Mr. McArthur says that *Plusia interrogationis* has the habit of resting on birch stumps, in places where the heather has been burned down during the previous year, and that the female moths deposit their ova on the young heather growing in such spots. He adds that larvæ of the species may be swept off the older heather, but these are almost invariably ichneumonised.—ED.]

PLUSIA IOTA LARVA FEEDING ON HAWTHORN.—It is probably not generally known that the larva of *P. iota* will feed and thrive on hawthorn (*Cratægus oxyacantha*). This fact was indeed new to me until about a week ago, when I received fifty larvæ of the insect in question from East Yorkshire. Among other plants which, as the leaves were more or less consumed, I failed to recognise, was a sprig or two of hawthorn, and with this plant the larvæ have since been supplied. Several are now in pupæ, and all are fast approaching maturity. I may add that I have occasionally found larvæ of *P. iota* on hedge wound-wort (*Stachys sylvatica*).—R. S.; May 20, 1890.

DIANTHÆCIA CARPOPHAGA, Bork., var. *CAPSOPHILA*, Dup.—Referring to *D. capsophila*, in the 'Entomologist's Annual' for 1864, Dr. H. G. Knaggs says:—"It is by no means unlikely that this species may eventually prove to be a variety of *D. carphophaga*; but it seems advisable to hear what the continental authors, who have so unanimously adopted it as a 'good species,' have to say in the matter, before rashly expunging it from our lists."—R. S.

MACROGLOSSA STELLATARUM.—My brother and myself took thirty-one larvæ of *Macroglossa stellatarum*, in various stages of growth, between the 1st and 5th of September, last year, in South Devon. Four of these died, but the rest turned into pupæ, from which the moths emerged at different periods, between October 20th and November 26th, nearly always in the afternoon. We also captured thirteen *P. actæon* in the same locality.—C. M. WELLS; Hurstfield, The Avenue, Gipsy Hill, April 28, 1890.

SMALL EXAMPLE OF THE EARLY BROOD OF *TEPHROSIA CREPUSCULARIA*.—Of *Tephrosia crepuscularia*, I captured on 19th April, here, a very diminutive specimen, only measuring $1\frac{2}{3}$ inch from tip to tip of the wings. It is one of the brown forms, and the markings are much suffused. I

have, before, occasionally seen small forms at this season of the year. That this moth is certainly affected by locality, as stated during the *Tephrosia* controversy, is very evident the more one observes it, and that even in *southern* forms themselves.—T. B. JEFFERYS; Clevedon.

IS *EUPITHECIA ABIETARIA*, Göze, IDENTICAL WITH *E. TOGATA*, Hübn.?—Some of the specimens comprised in my series of *E. togata* agree very well with *E. abietaria*, Göze, whilst other examples connect these with typical *E. togata*. All the specimens are from Scotch localities, and the majority were bred from pupæ. The variation in size is considerable; some examples hardly expand three-quarters of an inch, others measure one inch and a quarter. In the large specimens the tips of the wings appear rather more pointed than they do in the small specimens. Some had very bright red bands when they were fresh, but these have now lost their brilliancy. The central black spot of fore wings is always present, but varies in size; in some specimens it unites with one on the costa, and forms a short black fascia. The first and second lines are much nearer together in some specimens than in others, and in a few examples these lines exhibit a tendency to unite below the middle. From all I can ascertain of the appearance and habits of the larva of *E. abietaria*, there is nothing to separate it from that of *E. togata*, and I certainly fail to find that the two insects are specifically distinct in the perfect state. Compared with *abietaria*, *togata* is said to be larger, with bright red bands and larger central black spots, but none of these differences appear to hold good, as there are gradations in expanse and modification of markings. On the Continent, *togata* is much less frequently met with than *abietaria*.—RICHARD SOUTH.

VITALITY OF THE LARVA OF *SPILOSOMA FULIGINOSA*.—In the January and February numbers of 'Insect Life,'—a periodical edited by Professor Riley, and published by the U. S. Department of Agriculture,—is an interesting account of the life-history of *S. fuliginosa*, Linn. The writer, Mr. O. Lugger, says that in the district of St. Anthony, Minn., the species occurs commonly. Late in the autumn, "when the side-walks are covered every morning with a thick layer of frost, the larvæ are rather abundant. They leave their hiding-places and crawl over the side-walks; at this time they are frequently themselves incrustated with crystals of ice. Some few days ago, with the thermometer ranging from 5° to 3° below zero, I found several of them crawling slowly through the snow. When the side-walks, made of boards, become warmed up by the rays of the sun, the caterpillars crawl away to the shady and cooler part." As an instance of the remarkable vitality of the larva, Mr. Lugger observes that on December 3rd, 1889, he found "in a little depression of the soil a clear cake of ice, and embedded in it the larva of the above species. By means of a hot iron I separated a cube of ice with the enclosed larva, and took it to my office. The caterpillar was entirely and solidly enclosed by the ice; no air-spaces could be detected among the hair. How long the caterpillar had been enclosed I could not say. Left the cube of ice in front of my window, where the temperature sunk for two days to 11° below zero. Later the weather moderated, and during the day a little ice would melt near the caterpillar, but never exposing it to the air. After being enclosed for fourteen days, I carefully melted the ice, and removed the caterpillar to a piece of blotting-paper. In less than thirty minutes the larva was crawling about, not injured in the least. Yet, to escape further experimentation, it has shown good sense and

spun up, and transformed into a pupa, healthy to all appearances." From the description of the imago it would seem that the American representative of *S. fuliginosa* is identical with that from Scotland; both are referable to var. *borealis*, Staud.—R. S.

LOCALITY LABELS FOR SPECIMENS.—I have often wondered this question has not been raised before, as I am convinced any publisher would make it pay if it was done in a large systematic way. Would it not be advisable to have a label printed for each county, and, where a large one, indicated by N., S., &c., for north and south, &c.; also, such as London, Manchester, Aberdeen, &c., for the towns where there are a considerable number of entomologists residing. It would be a good plan to leave a space for the strata on which the insects were taken,—chalk, clay, &c.; and of course a place for the date. Size, too, is a most important item, as they cannot be too small, for labelling the Micros, very well. About $\frac{3}{4}$ in. by $\frac{1}{2}$ in. would be ample for any insect, if not too large. Some collectors prefer an excessively minute label, which they pin underneath the specimen; this means the insect being taken up each time reference is made, which does not improve the specimen. In rare cases this can be done as well; but the label pinned at the side of the specimen or series from a particular locality facilitates reference considerably, and is, I think, the better plan.—A. E. HALL; Norbury, Sheffield, May, 1890.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—May 7th, 1890.—Capt. Henry J. Elwes, F.L.S., Vice-President, in the chair. Mr. W. G. Blatch, of 214, Green Lanes, Birmingham; Mr. F. J. S. Chatterton, of 132, Queen Victoria Street, E.C.; Mr. Charles Fenn, of Burnt Ash Hill, Lee, S.E.; and Mr. George B. Routledge, of 50, Russell Square, W.C., were elected Fellows; and Mr. A. E. Stearns was admitted into the Society. The Secretary read a letter from the Vicar of Arundel, asking for advice as to the course to be taken to get rid of the larvæ of a beetle which were destroying the beams of the Parish Church. Mr. C. O. Waterhouse said he had already been consulted on the question, and had advised that the beams should be soaked with paraffin oil. Dr. Sharp, Mr. M'Lachlan, Dr. P. B. Mason, and the Chairman made some remarks on the subject. Dr. Sharp exhibited specimens of *Caryoborus lacerdæ*, a species of Bruchidæ, and the nuts from which they had been reared. He stated that three of these nuts had been sent him from Bahia by the late Senor Lacerda, about six years ago; that one of the beetles had effected its exit from the nut during the voyage; a second had recently emerged, after the nuts had been in this country for five years; and that a third had undergone its metamorphosis and died within the nut. Dr. Sharp also exhibited several specimens of Diptera collected by Mr. Herbert Smith in St. Vincent, and read a letter from him to Mr. Godman on the subject of the vast number of species of this order which he had recently collected in that island. Mr. M'Lachlan, Dr. Mason, Mr. Waterhouse, and Capt. Elwes took part in the discussion which ensued. Mr. R. F. Lewis, on behalf of Mr. W. M. Maskell, of Wellington, New Zealand, exhibited and read notes on about twenty-five species of Coccidæ from that colony. He also exhibited some specimens of the larvæ and imagoes of *Icerya purchasi*, Maskell, obtained

from Natal, where the species had proved very destructive to orange, lemon, and other fruit trees. He also showed specimens of the larvæ of an allied species from Natal, originally assigned by Mr. Douglas to the genus *Ortonia*, but which Mr. Maskell was inclined to regard as a new species of *Icerya*. Mr. M'Lachlan and the Chairman commented on the interesting nature of the exhibition, and the importance of a knowledge of the parasites of injurious insects, in connection with which special mention was made of the researches and discoveries of Prof. Riley. The Secretary exhibited, on behalf of Mr. T. D. A. Cockerell, of Colorado, a large collection of insect-galls, and read a letter from Mr. Cockerell on the subject. Dr. Mason said he should be happy to take charge of these galls, with a view of rearing the insects and reporting the results. Mr. H. W. Bates communicated a paper entitled "On new Species of Cicindelidæ."—H. Goss, *Hon. Sec.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—April 24th, 1890.—J. T. Carrington, F.L.S., President, in the chair. Mr. F. Warne exhibited a melanic variety of *Hemerophila abruptaria*, Thub., taken in the London district. Mr. Barrett asked whether this species had been recorded for any other neighbourhood. Mr. Briggs, in reply, said it was generally known that it occurred in the north and east of London only. Mr. Carrington, referring to the variety *hadita* of *Spilosoma lubricipeda*, Esp., remarked that between 1860 and 1870 this particular variety only occurred in a timber-yard close to the railway station at York; he had recently visited the neighbourhood, and was interested to find that, although the timber-yard had been taken by the railway company, the variety now occurred in fair numbers throughout the whole district, showing the gradual establishment of certain forms of variation. Mr. Tugwell exhibited specimens of the common butter-burr (*Petasites vulgaris*, Desf.), and made some remarks thereon, mentioning that it was the food-plant of *Hydracia petasitis*, Dbl. Mr. Tutt said that at Sheffield the species was taken in the factory yards on the plants growing among the refuse, but very rarely among the larger plants growing on the river banks. Mr. Rice, on behalf of Mr. H. Syer Cuming, exhibited, among other documents, the original rules and constitution of the Aurelian Society, bearing date June 1st, 1801; the rules and objects of the Entomological Society of London, founded on the Aurelian Society, and dated May 1st, 1806,—both being signed by the founders of the two Societies; a printed book of bye-laws of the latter Society, date 1807; an autograph letter and circular, signed by A. H. Haworth, dissolving the Entomological Society of London, date April 10th, 1806; a priced catalogue of Haworth's collection, sold at Stevens', June 23rd, 1834, and ten following days; and a catalogue of insects belonging to the Entomological Society, sold at Stevens', April 16th, 1858. Mr. R. Adkin read a paper on the "Occasional Abundance of certain Species of Lepidoptera in the British Islands." [See abstract of this paper on first page of the present number.] Messrs. South, Tugwell, Barrett, Carrington, and others took part in the discussion which followed.

May 8th, 1890.—The President in the chair. Messrs. S. G. C. Russell, of Balham; G. C. Dennis, of York; and J. H. Rowntree, of Scarborough, were elected members. Mr. Charles Fenn exhibited *Hedya pauperana*, Dup. Mr. Moore, galls of the so-called whistling tree, *Acacia fistula*, from Lower Egypt. Mr. Clarke, two series of plants from Cambridge and Penzance. Mr. Step, *Arum maculatum*, L., and gave an interesting account of the economy of the species.—H. W. BARKER, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—April 21st, 1890.—Mr. W. G. Blatch, President, in the chair. Mr. E. C. Rye showed *Brephos parthenias* from Cannock, &c. Mr. R. C. Bradley showed Diptera, including *Thereva ardea* from Wyre Forest, new to Britain; *Sapromyza platycephala* from Moseley, also new to Britain; and *Microdon devius* from Wyre Forest, confirmed as British. Mr. W. G. Blatch showed Coleoptera from Cannock,—*Cymurdis vaporariorum*, *Agathidium globosum*, *Homalota diversa*, and *Stenus guynimeri*, all new to the district. Mr. R. Freer read a paper on "Sexual Dimorphism," in which he contended that the pigment in the wings of insects was a development of waste energy; that females, which required much energy for the reproduction of species, and the development of the larger size necessary for that purpose, had little to spare for pigment, and were usually light; while males, which were smaller and used less energy in the reproduction of species, were usually darker. Much discussion followed the paper, in which Messrs. W. G. Blatch, Neville Chamberlain, H. Stone, E. C. Rye, and C. J. Wainwright took part.

May 5th, 1890.—Mr. W. G. Blatch, the President, in the chair. Mr. John Galbraith, of Harborne, was elected a member. Mr. Neville Chamberlain showed *Ennomos quercinaria* and *Ematurga atomaria*, in both of which species the males are larger than the females, and which, therefore, weighed against Mr. Freer's theory of sex, as given at the last meeting. Mr. R. C. Bradley showed Diptera,—*Xylota signis* from Sutton, and *Xabiens sylvanum* from Wyre Forest. Mr. W. G. Blatch showed Coleoptera,—*Calodera aethiops*, *Oxyptoda lentula*, *Dimopsis erosa*, and *Homalota diversa*, all from Knowle. Mr. G. H. Kenrick read a paper on "South African Butterflies," in which he gave an account of a recent journey there, and exhibited the species taken, which included *Danais chrysippus* (the commonest of all), many *Acræas*, *Papilios*, *Pieridæ*, &c.; also the moths, *Deiopeia pulchella* and *Sterrhia sacraria*. He showed several very interesting cases of mimicry. Mr. Chamberlain said he had been in Egypt at the time Mr. Kenrick was at the Cape; there he saw very few butterflies, but of those few *Danais chrysippus*, as at the Cape, was much the commonest.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

OBITUARY.

ENTOMOLOGY has lost an able, ardent, and most unselfish student in Mr. WILLIAM BERRY FARR, J.P. and Town Clerk of Maidenhead, who died on the 17th instant. Mr. Farr's collection of insects is large and in admirable order. Though of late years Entomology has supplied the chief occupation of his leisure time, and has carried him to almost every district in England, he was in fact an all-round naturalist of wide knowledge and experience. A fourteen years' residence in India afforded him an exceptional opportunity of studying in particular the habits of insects, birds, and reptiles, very many specimens of which attest the energy and success of his pursuit. Of late years Mr. Farr has been in failing health, but his favourite quest afforded him gratification till the last days of his earnest, manly, and well-spent life. We understand that his large collection, both of arms and objects illustrative of various branches of Natural History, may be acquired by the town of Maidenhead on the sole condition that a proper place is provided for its reception.

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COLEOPTERA COLLECTED BY MR. PRATT ON THE UPPER YANG-TSZE, AND ON THE BORDERS OF TIBET.

By H. W. BATES, F.R.S., F.L.S.

THE following is a list, with descriptions of new species, of the Coleoptera belonging to the three sections Geodephaga, Lamellicornia, and Longicornia, lately received by Mr. Leech, from his collector Mr. Pratt, in the interior of China. The greater number were collected at Chia-Ting-Fu, on the Min River, a tributary of the Yang-tsze, near the eastern border of Tibet and on the Wa-shan mountains, fifty miles south-west of that city. The two localities are near Mou-pin, a district in which French missionaries have long been settled, and whence numerous collections have been received in Paris and described by French entomologists. Many of the most striking forms enumerated in the following list are consequently already known, though until now wanting in English collections.

Family CICINDELIDÆ.

CICINDELA JAPANENSIS, *Chaudoir*.

Ichang. Found also near Fu-chau.

The examples sent are intermediate between the typical *C. japonensis* of Nipon and the form *C. maritima* of the widely-distributed *C. hybrida*. They differ from the Japanese species in the reddish coppery colour of the upper surface, though they agree with it in the subparallel form and rather fine granulation, and in colour of under-side and legs. The middle fascia of the elytra is less bent towards the apex, and the humeral lunule is generally entire, though sometimes interrupted.

CICINDELA SUMATRENSIS, *Herbst*.

Ichang.

Family CARABIDÆ.

NEBRIA PULCHERRIMA, *Bates*, Trans. Ent. Soc. 1873, p. 236.

Ichang. Found also in Japan, and constant in its coloration,

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—testaceous-yellow, with a round black spot on each elytron a little behind the middle and contiguous to the suture.

CARABUS TIENDEI, Thomson.

Chia-ting Fu (1000 feet), and Wa-shan (6000 feet).

Mr. Pratt had previously taken this species at Ichang and Kiu-Kiang, lower down the Yang-tsze. At Ichang it is smaller, and the peculiar sinuation of the elytral apex in the female, with tooth-like projection of the outer angles, is much less developed. Kiu-Kiang examples measure 37 millims.; those from Chia-ting Fu and Wa-shan are from 36 to 40 millims., but Ichang specimens are only 27—30 millims. Thomson gives 30—32 millims. as the size of the insect he described. The colour is nearly always black, with a slight silky gloss, but individuals occur of a bluish hue, and some have a purple-coppery tinge on the sides of the thorax and elytra. In the largest individuals the sides of the striæ are generally free from the row of minute granules which are seen in the smaller ones and in *C. protenes*, and which give the appearance of punctured striæ, the striæ proper being constantly impunctate.

CARABUS PROTENES, Bates, Proc. Zool. Soc. 1889, p. 217.

Wa-shan and Chia-ting Fu. Taken previously at Ichang.

This species is apparently closely allied to *C. delavayi* (Fairmaire), from Yunnan. The thorax varies considerably in outline, being sometimes—as in the description above cited—elongate, slightly dilated before the middle, and thence narrowed to the apex, but in other examples broader anteriorly, and in others decidedly but gradually narrowed behind, with sinuated margin, and narrow, acute, and deflected hind angles. Occasionally the side carinæ of the triplets of the elytra are depressed and sub-interrupted, as occurs in *C. monilis* and allied species.

CARABUS FIDUCIARIUS, Thomson.

Chia-ting Fu. A widely-distributed Chinese species.

CARABUS PRATTIANUS, n. sp.

Closely allied to *C. tiendei*, and of the same greatly elongated form, with (in female) strongly sinuated and dentated apices of elytra; the thorax is also similar in being broadly rotundate-dilated in front and strongly narrowed behind, with very little sinuation and obtuse deflexed hind angles, the surface minutely and irregularly rugulose. But it differs conspicuously in the sculpture of the elytra, which consists on each side of three rows of large convex tubercles, separated from one another, and from the sutural and lateral spaces, by a strongly elevated carina; the lateral marginal space has a shorter row of similar but smaller tubercles, followed by a minutely granulated margin; the sutural area is depressed and transversely rugulose. Long. 38 millim. ♀.

Ichang. A single example.

CARABUS MECYNODES, n. sp.

Allied to *C. davidis* (Deyrolle). In form the male, though relatively equally elongate, is more cylindrical than that of *C. tientei* and *C. protenes*, the elytra not being perceptibly widened behind, and the convexity sloping to the apex. The thorax is very similar in form to that of *C. tientei*, being broad and rounded in front and narrowed behind, with little sinuosity, to the subobtusely hind angles, but the surface is much more faintly rugulose. The elytra have the same type of sculpture, viz., three chain-striae on each, separated from one another, and from the sutural and marginal spaces, by three carinae, but the striae are much less deeply incised. The lateral space exterior to the three carinae is minutely granulated in lines. The apex (in the male) is sinuated rather more strongly than in the same sex of *C. tientei*. In colour the species is very different, the head and thorax being dark bluish green and the elytra purple-coppery. The palpi, dilated anterior tarsi, and ventral grooves are as in *C. tientei* and allies. Long. 30 millim. ♂.

Wa-shan. Three examples, all males.

CARABUS VIGILAX, n. sp.

A species of the same group as *C. tientei* (subg. *Morphocarabus*, Géhin), but distinguished from all the others by its very prominent eyes and cordate-quadrate thorax, strongly sinuate and narrowed behind, with outstanding and subacute hind angles. Elongate, slender, elytra moderately elongated, convex behind the middle, and flattened at the sides and apex; black, neck constricted; thorax faintly coriaceous; elytra obliquely subtruncated at the apex, each with three chain-striae, and with four series of triple carinae, the lateral one granulated and less regular, the striae very faintly punctured; the large foveae of the chain-striae impinge in some cases on the adjoining carina on each side, and therefore show an approximation to the type of sculpture characteristic of the *sylvestris* group (subg. *Oreocarabus*, Géhin). The legs are elongate; the anterior tarsi of the male have four nearly equally dilated joints; the 4th to 6th segments of the abdomen have a curved transverse groove: the terminal joints of the palpi are very slightly dilated, even in the male, and the antennae in the same sex are simple and elongated. Long. 22 millim. ♂, ♀.

Wa-shan, alt. 6000 feet; Chia-ting Fu, 1000 feet.

COPTOLABRUS PUSTULIFER, Lucas, Ann. Soc. Ent. Fr. 1867 and 1872, p. 293, t. 14, f. 12.

Mr. Pratt obtained a fine series of this very remarkable species both at Chia-ting Fu and at Wa-shan, all the examples being conformable to the description and figure given by Lucas above cited.

COPTOLABRUS PRINCIPALIS, Bates, Proc. Zool. Soc. 1889, p. 216.

Ichang. Further specimens of this species, distinguished by the elegance of the elytral sculpture from the allied species of similar emerald-green and golden-coppery colours, have been received from the same locality, the neighbourhood of Ichang, whence came the original examples.

COPTOLABRUS LONGIPENNIS, Chaudoir, Ann. Soc. Ent. Fr. 1863, p. 449.

Ichang. In the 'Proceedings Zool. Soc.' 1889, p. 217, I have given the reasons for referring the insect previously taken by Mr. Pratt, at Ichang, to the species described by Baron Chaudoir.

CALOSOMA CHINENSIS, Kirby.

Many examples from Wa-shan and Chia-ting Fu. The species is common in eastern China, and in the north as far as the Amur.

CALOSOMA THIBETANUM, Fairmaire, Ann. Soc. Ent. Belg. xxxi. p. 92.

Apparently an abundant species at Wa-shan and Chia-ting Fu ; there is also one example in the collection received from Ichang. The species was first met with by the French missionaries at Moupin, near the Tibetan frontier, and is distinguished from *C. lugens* (Chaud.), and other species of the *C. investigator* group, by the angular dilatation of the sides of the thorax and the non-metallic foveæ of the elytra.

CHLÆNIUS NÆVIGER, Morawitz.

Wa-shan, alt. 6000 feet ; Ichang. Found also in Japan.

CHLÆNIUS COSTIGER, Chaudoir.

Wa-shan, alt. 6000 feet. A widely-distributed insect in Eastern Asia, occurring from Japan to Cambodia. Sze-chuen examples resemble those from Cambodia in the thorax being brilliant green, with little trace of coppery reflections.

HARPALUS VICARIUS, Harold.

Wa-shan, 6000 feet ; also Eastern Siberia and Japan. A species closely allied to the common European *H. ruficornis* (Fab.). The differential characters relied on by Harold are, however, not constant, some of the Chinese examples having the hind angles quite as rectangular as British specimens. In Japan individuals occur with smooth head and centre of thorax ; but others have finely punctured thoracic disk and the head faintly punctured. All the Wa-shan examples are like the last mentioned.

HARPALUS TRIDENS, Morawitz.

Wa-shan. Found also at Ichang and Kiu-Kiang, and in Japan as far north as Hakodate.

HARPALUS CHALCENTUS, Bates, Trans. Ent. Soc. 1873, p. 263.

Ichang. A common species throughout Eastern China, Japan, and Korea.

CURTONOTUS NITENS, Putzeys.

Ichang. Also a widely distributed species throughout the Pacific sea-board of Asia.

PTEROSTICHUS (?) PRATTII.

Very near *P. simillimus* (Fairmaire), differing in its larger size, more elongate, though robust, form, and the longer, squarer thorax, with nearly rectangular hind angles. Black ; head moderate, much narrowed behind

the eyes; frontal furrows faintly impressed, flexuous; antennæ nearly half the length of the body. Thorax as long as broad, gradually and slightly narrowed behind to the apex of the nearly rectangular angles; lateral rim accompanied by a sharply incised furrow; basal foveæ sharply impressed, two on each side, the inner one long, the outer very short and communicating with the inner one by a short basal furrow. Elytra elongated, rounded at the shoulders, obliquely sinuated at apex, broadest far behind the middle, deeply striated; scutellar striole null, except a short oblique incision close to the basal fold; interstices moderately convex, much narrowed near the apex, and the 9th narrow throughout; one dorsal puncture only on the 3rd interstice far behind the middle; the 8th stria regularly ocellate-punctate. Beneath nearly smooth. ♂. Terminal ventral segment with a central sharp carina strongly elevated in the middle. Long. 23—26 millim. ♂, ♀.

Wa-shan. A large series of examples. The species, like *P. simillimus* (Fairm.), is allied to the European *P. melas*, but it is a much larger insect than either, and the thorax is differently shaped. The palpi in the male are somewhat dilated, especially the labials, and truncated at the apex. The middle episterna are short and broad.

TRIGONOTOMA DOHRNII, *Chaudoir*.

Ichang. A species of South-eastern China, found at Hong Kong, and also at Saigon in Cambodia.

DOLICHUS FLAVICORNIS, *Fabr.*

Wa-shan. Found in the warmer temperate latitudes throughout Europe and Asia.

COLPODES AMÆNUS, *Chaudoir*.

Wa-shan. A widely distributed East Asiatic species. *C. superlita*, Bates (Proc. Zool. Soc. 1888, p. 383), from Kiu Kiang, is probably only a variety, in which the produced apex of elytra is truncated and spined at the sutural angle; the thorax is, however, a little shorter and more sinuated behind. The single example from Wa-shan is nearly intermediate between the two forms.

Family COPRIDÆ,

SYNOPSIS DAVIDIS, *Fairmaire*, Ann. Soc. Ent. Fr. 1878, p. 96, pl. 14, f. 5.

Wa-shan. Originally taken by Père David in "Central China." The species is very distinct from the Indian forms previously described, by its subopaque and finely reticulated elytra, in which the striæ are scarcely visible.

ENOPLOTRUPES SINENSIS, *Lucas*.

Wa-shan, alt. 6000 feet. Taken by Père David in the district of Moupin, Eastern Tibet.

ENOPLOTRUPES VARIICOLOR, *Fairmaire*.

Wa-shan, alt. 6000 feet. Recorded by Fairmaire as taken in the interior of China.

(To be concluded.)

DESCRIPTIONS OF NEW SPECIES OF PHYTOPHAGOUS
COLEOPTERA RECEIVED BY MR. J. H. LEECH, FROM
CHANG-YANG, CHINA.

BY MARTIN JACOBY, F.E.S.

(Concluded from p. 197.)

ANTIPHA VARIPENNIS, n. sp. (Pl. II., fig. 7.)

Ovate, widened posteriorly, black; the head, thorax, and the anterior legs testaceous; elytra strongly punctured, testaceous, the sutural and lateral margins metallic dark blue. Length, 2 lines.

Var. Entirely dark blue or violaceous; the head and thorax sometimes margined with pale fulvous.

Head impunctate, with a deep fovea between the eyes; antennæ rather more than half the length of the body, black, slender, the second joint very short, the third slightly shorter than the fourth joint; thorax narrowly transverse, more than twice as broad as long, the surface rather convex, the sides somewhat rounded, the angles slightly thickened but not produced, the anterior ones rather oblique, the disc nearly impunctate; scutellum black; elytra with a scarcely perceptible depression below the base, distinctly punctured in closely approached rows, testaceous, the sutural margin narrowly, and the lateral one more broadly, metallic bluish; under side black; legs more or less testaceous, the tibiæ dark, unarmed; anterior coxal cavities closed.

Of this species two forms are before me, which differ in no other way from each other except in that of colour; and although I have taken the paler form for the type, there are as many specimens of the darker variety contained in this collection. That both really represent the same species is proved by those specimens of the variety which show traces of the pale colour of the type, either at the head, thorax, or elytra. From *A. pretiosa*, Baly, and most of its allies, *A. varipennis* differs in the more convex shape and rounded sides of the thorax, the black antennæ, and entirely or almost impunctate thorax; the much more transverse thorax and its rounded sides distinguishes the species from *A. puncticollis* and its blue varieties.

Numerous specimens of both forms.

ANTIPHA FLAVIVENTRIS, n. sp.

Elongate, piceous below; above metallic blue; thorax strongly punctured (♂), or nearly impunctate and bifoveolate (♀); elytra closely and strongly punctured; abdomen flavous. Length, $2\frac{1}{2}$ —3 lines.

Mas. Head smooth, impunctate, dark blue (sometimes with a fulvous tint), frontal elevations transverse; the clypeus strongly raised, triangular; antennæ half the length of the body, black, the fourth joint one-half longer than the third, the terminal joints rather shorter and thicker; thorax nearly twice as broad as long, the sides straight, the angles tuberculiform, the surface with two foveæ, rather strongly but sparingly punctured, the punctures stronger within the depressions; scutellum black; elytra but slightly widened posteriorly, without any depression below the base, dark metallic blue, strongly punctured in closely approached rows; under side and legs piceous; abdomen flavous or fulvous; tibiæ unarmed, the first joint of the posterior tarsi as long as the following three joints together; prosternum distinct between the coxæ; anterior coxal cavities closed.

Fem. Thorax nearly impunctate, the two depressions deeper; elytra with a lateral ridge below the middle.

This *Antipha* has the same coloration as so many species of *Luperus*, and the differences between the sexes are rather considerable, as pointed out above. The flavous abdomen and more elongate shape separates *A. flaviventris* from its allies inhabiting the same regions.

Six specimens.

LIROËTES, *Weise*.

The author, who lately has established this genus on a species of *Galeruca* allied to *Thyllobrotica*, does not mention the distinctly incrassate palpi, nor the length of the first joint of the posterior tarsi, which is as long as the three following joints together. Besides the typical form, *L. æneipennis*, two other species are contained in the present collection.

LIROËTES LEECHI, n. sp.

Pale fulvous; the vertex and the scutellum black; thorax trifoveolate, nearly impunctate; elytra metallic green, closely and semi-rugose punctate, the basal portion raised. Length, 4 lines.

Closely allied to *L. æneipennis*, Weise, but at once distinguished by the black vertex of the head, and the more transversely-shaped thorax; head nearly impunctate, the vertex black, shining, the lower portion flavous; the clypeus in shape of a transverse swollen ridge; palpi incrassate; antennæ two-thirds the length of the body, flavous, the basal joint sometimes stained with black above; thorax rather more than twice as broad as long, the sides nearly straight, the anterior angles rounded and thickened, the posterior ones obliquely shaped, the surface impressed with some scarcely perceptible punctures, flavous, the sides and the middle of the base with a more or less distinct depression; scutellum black; elytra metallic green, very closely punctured, the interstices slightly wrinkled, the basal portion distinctly raised, the sides with an elongate broad depression, commencing below the shoulders and not extending to the apex; elytral epipleuræ extremely narrow; anterior coxal cavities open.

The specimen, which I look upon as the male, has the abdomen in a too shrivelled-up state to judge of its construction, but there seems to be the same deep longitudinal cavity as is found in *L. æneipennis*.

A single specimen.

LIROËTES FULVIPENNIS, n. sp. (Pl. II., fig. 2.)

Reddish fulvous; antennæ and legs black; head and thorax impunctate; elytra extremely finely punctured, the basal portion scarcely raised. Length, 4—5 lines.

Elongate, scarcely widened posteriorly; the head impunctate; antennæ black, two-thirds the length of the body; thorax twice as broad as long, impunctate, the posterior angles oblique; elytra minutely punctured, their epipleuræ extremely narrow; legs black.

Of this species many specimens were obtained. It agrees in every respect with the type of the genus, and the male has the same deep elongate cavity at the abdominal segments, the last ending into a triangularly-shaped point; the fourth segment has

also a small incision at the middle of its margin; in many specimens the sides of the head are stained with piceous; but the general colour of the insect is uniformly darker or paler fulvous, and shining.

LIROËTES ÆNEIPENNIS, *Weise*. (Pl. II., fig. 3.)

A dozen specimens.

MONOLEPTA LEECHI, n. sp.

Black; the head, the basal three joints of the antennæ, the thorax, and the anterior legs, fulvous; thorax finely punctured; elytra closely punctured, black, a transverse narrow band at the middle, yellowish white. Length, $1\frac{1}{2}$ line.

Var. The abdomen (the last segment excepted) flavous.

Head impunctate, the frontal elevations broad, trigonate, the clypeus broadly triangular, smooth, labrum and palpi piceous; antennæ extending to rather more than half the length of the body, black, the basal three joints fulvous, shining, the second and third joints short, subequal; thorax twice as broad as long, the sides very slightly rounded towards the base, the basal margin regularly rounded, the anterior one straight, the angles not produced; scutellum black, impunctate; elytra very closely and finely punctured, their epipleuræ disappearing below the middle; the under side and legs black, the anterior legs fulvous; tibiæ with a long spine, the first joint of the posterior tarsi half the length of the tibiæ; anterior coxal cavities closed.

Closely allied to *M. albofasciata*, Jac. From Burmah, but differing in the colour of the antennæ, that of the legs, and the want of the red colour at the apex of the elytra. In the variety the abdomen is partly flavous.

A few examples.

SEPHARIA, *Fairmaire*.

The author, who established this genus on two species from China ('Annales de France,' 1889), has said nothing about the length of the posterior tarsi, which is as necessary to mention as any other structural character, considering the enormous mass of described genera of Galerucidæ. I have lately received, from the museum of Calcutta, an insect which answers completely Fairmaire's description of his *Tepharia rubricata* from Moupin, with the exception of the size and colour. The Indian specimen labelled "Kullu," instead of being 8 mill. is only 6 mill. in length, and the colour of the upper surface is not fulvous ("rougeâtre clair"), but very pale testaceous; all the structural characters, spots on the elytra and under side agree, however, exactly with the description; to which I may add, that the first joint of the posterior tarsi is much longer than the following joints together. In the Indian specimen there is also a small piceous spot at the under surface of the head and the under side of the thorax at each side, and the abdominal segments are testaceous, with a black triangular spot at each side (Fairmaire describes them as black, broadly margined with flavous).

ALLOPHYLIA, *Weise*.

This genus is, without doubt, identical with *Charidea*, Baly

(Journ. Linn. Soc., vol. xx. p. 157, 1888), and the species described by Weise as *A. aurora* synonymous with *C. fortunei*, Baly, likewise from China. The type of the genus was originally described by Motschulsky as *Galeruca punctato-striata*, and by myself as *G. multicostata*.

GALERUCELLA (GALERUCIDA) NIGRIMEMBRIS, *Fairm.*

The generic name of *Galerucella* should evidently be substituted for *Galerucida*, since the author compares his species with my *Galerucella semifulva*, and his description agrees with a species of the latter genus, but certainly not with the genus in which he places it.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. PERRY COSTE, F.C.S.

IV.—RESULTS.

IN this section the bare results of my experiments will be found; whilst in succeeding sections I shall have to explain at some length what is, in my view, their significance, adducing at the same time various details that do not appear now, but may most conveniently be discussed in a *resumé* after the broad facts have been stated.

Now I may explain that the result of every experiment was noted down at once,—that is, as soon as the hour's exposure was completed. From these notes there were afterwards compiled, in systematic form, complete tabulations of *all* the results yielded by these some thousand or two experiments. I do not propose, however (having regard to the exigencies of space, and to the tempers of the compositors), to inflict these tabulations in their entirety on readers of the 'Entomologist,' who might, too, find their patience sorely taxed by an attempt to wade through such a mass of details. Fortunately these results, which it seemed necessary to have thus tabulated for my own use, admit of being very greatly condensed for publication. As regards the effects on black and white, and several minor colours, they may be better described without formal tabulation; whilst for the rest, remembering that most of my reagents employed were superfluous, it will be easy enough to tabulate the results for the half dozen reagents which I have selected for final use. I will give, first of all, the bare results, leaving comment and explanation until afterwards, and taking the colours under the following headings:—Black, white, yellow and orange, red and pink, chestnut-brown, green, blue; and, lastly, a few minor colours, as greyish, brown, and metallic colours (*sic*).

1. BLACK.—Insects experimented on:—*Pieris brassicæ*, *Colias edusa*, *Argynnis paphia*, *Melitæa athalia*, *Vanessa atalanta*,

V. cardui, *V. urticae*, *Melanargia galatea*, *Pararge megæra*, *P. egerides*, *Epinephele tithonus*, *E. hyperanthes*, *Cænonympha pamphilus*, *Lycæna artaxerxes*, *Polyommatus phlœas*, *Arctia caia*, *Spilosoma menthastri*, *Acronycta psi*, *Triphæna pronuba*, *Catocala nupta*, *Moma orion*, *Agriopis aprilina*, *Venilia maculata*, *Abraxas grossulariata*, *Amphidasys betularia*, *Larentia fluctuata*, *Tanagra (Odezia) atrata*.

These, it will be noticed, include representatives of all the great divisions of Macro-Lepidoptera, except the Sphingidæ.

The reagents used were, on the average, 14 or 15 to each insect, making, therefore, a total of nearly 400 experiments on this colour (*sic*); and there is the most complete unanimity possible in the behaviour of black throughout all these divergent families, for in every single instance the result has been *nil*. In about seventeen instances I have recorded as the result, "little faded," "trifle faded (?)," "browner," &c.; but practically, and to all intents and purposes, we may say that, so far as these experiments go, *black* is utterly unassailable by any reagent yet used.*

2. WHITE. — Species experimented on:—*Pieris brassicæ*, *Vanessa atalanta*, *V. cardui*, *Limenitis silylla*, *Melanargia galatea*, *Arctia caia*, *Spilosoma menthastri*, *Leucoma salicis*, *Hepialus humuli*, *Acronycta psi*, *Catocala nupta*, *Abraxas grossulariata*, *Amphidasys betularia*, *Larentia fluctuata*.

Here, also, are included representatives from each of the main divisions of Macro-Lepidoptera, except the Sphingidæ.

The reagents used were, on an average, 16 to each species, making a total of over 200 experiments on *white* colouring. The results are *almost* as perfectly unanimous as those with black, and, similarly, the result was always *nil*. White is as unalterable as black, and defies equally the action of all my reagents. One honourable and most interesting exception to this otherwise universal sullen indifference must, however, be emphasized,—the *white* of *M. galatea* is changed to a *deep lemon-yellow* by ammonia, and is affected similarly to a greater or less extent by potassic hydrate (sodic hydrate), nitric acid, a *little* by potassic cyanide, and also by 30 per cent. hydrochloric acid; but under the influence of this *last* reagent the yellow was only temporary, as the wing went transparent. No other reagents yellowed it. In a few species with white wings the wing became more or less

* It may, possibly, cause some surprise that I have said nothing of any attempt at *bleaching* these colours. As a matter of fact, however, I have—since the first portions of this article were written—tried a few experiments in that direction, using as a bleaching agent hydrogen peroxide, which I thought would be in many ways preferable to chlorine. The results, however, were such as to persuade me that but little was to be gained by the method, and I therefore have not referred to it in the text, although contemplating some further experiments therewith before abandoning it for good.

transparent under treatment; and in *Hepialus humuli* nearly every reagent removed the white appearance, and left a more or less transparent wing. Of a doubtful reaction with *Amphidasys betularia* I will speak later, when discussing these results.*

There is also a special and independent series of experiments that I have made as a forlorn hope of discovering something about this uncompromising pseudo-colour. It was intimated in section III. of my paper, which appeared last month, that an attempt would presently be made to discriminate between the various whites by staining with iodine. Since that passage was written, I have conducted a set of experiments with this reagent; and in order to make the investigation more thorough, I made parallel sets of experiments with four other staining reagents, *viz.*, logwood, rosein, methyl aniline green, and methyl aniline violet. These experiments were made under the same conditions as all previous ones, except that the wings were first damped with alcohol. After one hour's exposure, the staining fluids were thoroughly washed off (no such easy matter), and then the staining effects on the wings were noted.

Logwood.—The results with this were so negative and unsatisfactory as to deserve no record.

Rosein.—Since this stained everything red indiscriminately, it is also useless to detail any particulars.

Methyl aniline green and violet, and iodine.—The results yielded by these reagents are recorded in the annexed table. The iodine was a 16 per cent. solution in absolute alcohol, but the working was rendered less quantitative owing to the partial evaporation of the alcohol after being exposed some time, and the consequent necessity of adding either fresh alcohol or fresh iodine solution. In all probability, however, the total staining effect was produced in the first very few minutes. As to the strength of the two methyl aniline stains, I cannot speak. They were originally obtained by me, as solutions, for use in botanical histological work, and are such as are always sold by microscopic dealers. I found it necessary to dilute them in these experiments.

The significance of the results will be discussed later, in the proper connection; and I need merely draw attention here to the effect on *P. brassicæ* and on *M. galatæa*.

* I noticed in one or two cases, when experimenting on other colours, that the very delicate *white fringes* which often border the wing were turned yellow by ammonia, potassic hydrate, and even one or two acids. Instances are afforded by *Lycæna artaxerxes* and *L. corydon* (and also by *Melitæa athalia*, with one or two reagents, anyhow). This yellow did not seem to me, however, in all cases so permanent as was the yellow produced in *M. galatæa*. I may as well add to the list given above the name of a tropical butterfly, *Papilio menesthenes*, one of a number kindly sent to me by Mr. Geo. C. Griffiths. The wings of this are marked beneath by large patches of white, represented by cream colour on the upper side. The appearance of this white led me to suspect that it might give the *galatæa* reaction, and I therefore tested it with the usual reagents. To my disappointment the results were all *nil*; and *galatæa* is, for the present, left in her almost unique position.

EFFECT OF STAINING REAGENTS ON WHITE-COLOURED SPECIES.

NAME OF SPECIES.	IODINE.	METHYL VIOLET.	METHYL GREEN.
<i>Pieris brassice</i>	Light coffee.	Deep <i>thick</i> violet. N.B.	Deep French sky-blue.
<i>Melanargia galatea</i>	Ditto.	A <i>bluer</i> violet. N.B.	Very pale blue.
<i>Vanessa cardui</i>	Coffee-brown.	Barely violet, very pale.	((O))
<i>Limenitis sibylla</i>	Almost entirely O.	Semitransparent violet.	Barely coloured.
<i>Heptadus humuli</i>	Beautiful yellow-brown.*	Irregularly violet, lighter.*	Blue.
<i>Callimorpha hera</i>	Light coffee.	Semitransparent mauve.	Greenish blue, not deep.
<i>Spilosoma menthastris</i>	Only yellowed; veins dark.	Deep violet.	Only lightly stained blue.
<i>Forthesia auriflua</i>	Coffee.	Violet.	Pale lavenderish blue.
<i>Phalera bucephala</i>	Dull coffee.*	Very slightly violet.*	In part, slightly blue only.
<i>Acronycta psi</i>	Little yellowed only.* †	Very slightly violet indeed.*	Pale lavenderish blue.
<i>Orthostia maculenta</i> . ?	Light brown.*	Transparent violet.	Green-blue irregularly.
<i>Agrotis segetum</i> . ?	Light bright yellowish.	Transparent violet.*	Pale lavenderish blue.
<i>A. xanthographa</i> . ?	Ditto.†	Transparent violet.	Slightly, and in part, blue.
<i>Phlogophora meticulosa</i>	Ditto.†	Transparent violet.*	Scarcely tinted.
<i>Anisopteryx oscularia</i>	Ditto.* †	Very slight transparent violet.*	Scarcely tinted.
<i>Abraxas grossulariata</i>	Only yellowed.†	Transparent violet.	Slightly, and in part, blue.
<i>Cabera (pusaria)</i>	Slightly yellowed only.* †	Ditto.	Very slightly lavenderish.
<i>Melanippe montanata</i>	Light brown.* †	Ditto.	Blue.
<i>Amphidasys betularia</i>	Light brown. . . . .	. . . . .

* In those marked thus *, the fringe *line* (not fringe) bordering the hind wing was stained far deeper than the rest of the wing.

† Veins stained deeper. Some such method of staining would probably be found useful in studying the neurulation.

In the five species of Noctuae, the hind wings of course are referred to.

As a matter of convenience, in publishing, we will reserve the tables of results in yellow, red, chestnut, blue, and green, until next month (although naturally they follow on here), and take the results afforded by the remaining and far less important colours.

First as to *brown*. This class is really intended as a sort of appendix to chestnut; for under the latter term are included all brown or chestnut colours that are affected by my reagents, whilst as brown are grouped together all the "indifferentists." It is, perforce, a somewhat heterogeneous assemblage, including many different browns, and two or three odd *chocolates* that I hardly knew how to dispose of, and therefore finally grouped with the browns.

The insects experimented upon were the following:—*Orgyia antiqua*, *Bombyx quercus* (male and female), *Orthosia macilenta* (?), *Mamestra oleracea*, *Cidaria suffumata*, *Coremia ferrugata*, *C. munitata*, and the chocolate (a) blotches and (b) lines on (a) *Rumia cratægata* and (b) *Phalera bucephala*.

On the average twelve or thirteen reagents were used to test each of these species; and, in spite of their heterogeneity, they agree admirably in being a most thoroughly unsatisfactory assemblage. There is nothing really definite to report of any of them, except that in nearly every case the effect was *nil*.

The most especially impervious were *P. bucephala*, *B. quercus*, and *C. suffumata*. In one or two instances *O. antiqua* faded somewhat, and ammonia left it "darker and duller." *R. cratægata* faded a good deal, too, under the influence of the alkalis. *O. macilenta* was changed to lighter and yellower, and *M. oleracea* to a duller brown than the normal.

Metallic spots and markings.—I had looked forward with very great interest to experimenting on these colours (*sic*), but they have proved wofully disappointing. Unfortunately I had only two or three metallic marked specimens on which to experiment, and it would be somewhat premature to conclude that all would behave similarly; but at any rate there is complete unanimity in the few results that I have, and I shall hope for an opportunity of supplementing these later.

The species experimented on were *Argynnis paphia*, *Plusia gamma*, *Euplexia lucipara*, and *Dione passifloræ*.

A. paphia. This was tested by twenty-four reagents, and the silver was left unaffected in each case, with a doubtful exception as regards nitric acid, which perhaps removed a little.

D. passifloræ.* Tested by the chosen seven reagents (see

* A Floridan species of the *Nymphaliniæ*, with magnificent blots of silver on under surface of hind wings. This was one of a large number of specimens for which I am indebted to the kindness of Mr. Geo. C. Griffiths, of Bristol. I am also heavily indebted to Dr. Crowfoot, of Beccles, for similar generosity; and gladly take this opportunity of acknowledging the kindness of these gentlemen, as well as

p. 187*), and also alcohol, and quite unaffected by any; except that nitric acid (50 p. c.) seemed to have removed much of the "silver," and exposed the brown wing beneath.

P. gamma. Eight experiments were made on this, and all without effecting any change.

E. lucipara. The doubtful bronzy markings on this were also tested, and without any different result.

Of the remaining colours equally there is nothing satisfactory to report. There are various half-tints and indeterminate shades very difficult to classify, and yielding nothing but negative results when treated. There is, for instance, what I have called *greyish*, under which head I placed the fore wings of *Acronycta psi* and of *Phalera bucephala*. These have been examined by means of most of the reagents, and with practically no results, except that the first seemed in several instances to become a trifle lighter; and the second certainly assumes a very sickly, washed out, indefinite appearance.† One somewhat interesting exception may, however, be noted: the grey of *A. psi* is turned quite *black* by *argentic nitrate*; but this (like the reactions of white wings with hydriodic acid) is probably due to simple staining.

Cream. An example of this is afforded by the hind wings, and also by the "buff tip," of *Phalera bucephala*. I have examined their behaviour with about a score of reagents each, and the results are all negative. In some cases the cream of the hind wing was a trifle "gone," or the wings partly transparent,—but that was all; and the buff tip was still more obdurate.

In concluding the list I may point out that hundreds of Lepidoptera, chiefly among the Noctuæ and Geometræ, display colours (save the mark!) that would defy any attempt to classify,—half-

of several other correspondents—*viz.*, Messrs. J. Anderson, jun., Carlier, Farren, Jackson, Jones (of Delawarr), and J. J. Weir.

With regard to these tropical species, I have decided not to tabulate any of the results with those previously obtained from English species; for it seems very undesirable to mix up a few tropical species with these now, while reserving for some later date the main body of results that I hope to obtain from extra-British Lepidoptera. On the other hand, several colours very sparsely represented by British species are common in exotic, and it seemed equally foolish to pay no heed to these when discussing the present results, and to be hampered by the limits of unnecessary ignorance. I therefore picked out for immediate experiment, from the specimens sent me, some that appeared likely to afford specially interesting results; and these results, although untabulated, I shall quote in their proper connexion when discussing the various colours. I seem to owe this explanation alike to my correspondents, who might perhaps be surprised at finding so little apparent use made of the specimens that they sent me, and to the general reader, who might be puzzled by finding tropical species alluded to in subsequent pages, whilst not mentioned in the tables.

* After the list of "six" reagents, add "and acetic acid."

† Apparently this is due to the bluish grey scales flaking off, and thereby exposing a lower stratum of scales of lighter hue.

shades of a dubious brownish greyish hue, that can be called nothing in particular. These I have, at least for the present, left alone, feeling fairly certain (a view quite confirmed by the experiments on *bucephala*, *O. macilenta*, *A. psi*, &c.) that no results—at least of a very definite character—would be forthcoming.

The number of heads under which I have grouped the colours may seem very few; but there *are* only a few distinct colours, and under yellow or red, *e. g.*, are included many different shades and hues. I have endeavoured, in these preliminary trials, to examine types of each *chief* colour in each of the large groups,* so far as possible, and intend now to extend my investigations to foreign representatives of—more especially—Rhopalocera and Bombycidae (and Sphingidae), since in these divisions there chiefly occur the brilliant colours: some interesting results may be expected perhaps among some of the Geometrae, but I have small hopes of the Noctuae, among which bright colours are scarce, and indefinite half-shades the rule.† Some further reference will be made to this below; and it now remains to discuss the significance of the foregoing results, and offer such interpretation of them as we can. I propose to consider them under *two* heads: first, taking their *chemical* aspect; and secondly, their biological or phylogenetic,—in which connexion I shall explain what seems to me their bearing on *Variation*.

(To be continued.)

TWO DAYS' COLLECTING IN NORMANDY.

By JOHN HENRY LEECH, B.A., F.L.S., &c.

I HAVE been frequently asked by British entomologists if I knew of a good collecting-place on the Continent within easy reach, affording a pleasant change for a short holiday, and the prospect of yielding a good return in the way of rare British insects, in addition to a few that have not as yet been recorded from England. The task of combining a short journey, a good collecting locality, and a modest expenditure, was by no means an easy one. As a boy I was fairly well acquainted with some parts of the coast of Normandy, especially the neighbourhood of Havre, and having very pleasant reminiscences of Tancarville (about 25 miles from Havre) I determined to give it a trial this season. Accompanied by Mr. South and Mr. H. McArthur, I left London at 9.45 on Friday night last (June 13th), and arrived at Tancarville by mid-day on Saturday. At first sight the locality bids

* *I. e.*, of course, as represented in England.

† A few experiments have already been made on Coleoptera, Neuroptera, and Diptera.

fair enough to produce no end of rarities in their season. The little village nestling at the foot of the wooded hills, and overshadowed by the noble ruins of the old castle from which it takes its name, faces the River Seine, and is separated therefrom by a broad stretch of marshy meadow land reclaimed from the river. On both sides are high limestone (?) cliffs rising several hundred feet sheer from the plain, and crowned with forest growth. Except on the low ground near the river, extensive woods meet the eye in every direction. The woods explored by us are in all stages of growth, some having been apparently cleared this year, while other parts appear to have been left untouched for ages. All the usual forest trees abound. In some parts birch—accompanied by bilberry, heather, and brake-fern—is luxurious; in others *Euphorbia*, hemp agrimony and foxglove form a striking feature. The ground at the base of the cliffs, especially towards the river, affords good collecting, and is very sheltered and warm. Sugaring was found to be most productive higher up the hills, especially the hill-side facing the castle. Behind the village is a swampy valley, full of willows, sallows, sedges, reeds, &c., that should produce, among other things, many species of *Leucania*. Although the weather, for the most part, was cloudy, and the nights rather raw, and succeeding a long spell of bad weather, we managed in our two days to get together a good long list of captures. The season was evidently a late one, judging by the species taken and the large proportion of freshly-emerged specimens. I can recollect, as a boy, taking, amongst other species in August, *Papilio machaon*, *Argynnis latona*, *Vanessa antiopa*, *Grapta c-album*, *Colias edusa* and *C. hyale*, *Satyrus semele*, *Melanargia galatea*, and *Callimorpha hera*,—the last common on the flowers of hemp agrimony.

The following notes may be of assistance to anyone who proposes to visit the locality during the season:—Leave Waterloo 9.45 p.m. for Southampton, Monday, Wednesday, and Friday; the train runs alongside the steamer, which leaves at midnight, arriving at Havre between 8.30 and 9 the following morning. Return fares, 1st class, 40s.; 2nd class, 30s. Take no luggage except such as can be carried by hand. Drive at once to the railway-station, and catch the 9.28 a.m. (next train 12.28 p.m.) to St. Romain: 1st class, 2 f. 20 c.; 2nd class, 1 f. 65 c. An omnibus takes you from the station to the town of St. Romain for 30 c. At the hotel 'Du Nom de Jesus' an excellent lunch can be had for 2 f. 50 c. or 3 francs, and a carriage obtained to drive to Tancarville (about 11 kil.) for 6 or 7 francs, or, if informed beforehand, the landlord of the hotel at Tancarville will send a carriage to the station of St. Romain for 8 francs, which would save time. At Tancarville there are several inns, the best of which is the 'Hotel du Havre'; the charges are 7 to 8 francs per day, including excellent cooking and very good cider. The travelling expenses

for the complete return journey, 1st class, for one person, amount to exactly £3; of course it would be something less for two or more people, as the cost of carriage, &c., would be shared; a considerable saving could also be effected by travelling 2nd class. It would be well to advise the landlord of the hotel at Tancarville, so that he could reserve rooms, as the accommodation is rather limited, but no doubt beds could be obtained outside. For the return journey, trains leave St. Romain station at 4.5 p.m. and 7.30 p.m., the latter allowing plenty of time to catch the steamer, which starts at 9 p.m. on Mondays, Wednesdays, and Fridays. The train arrives at Waterloo by 10 a.m. The entomologist ought to be able, by leaving London at 9.45 on a Friday night, to spend from 11 a.m. on Saturday to 6 p.m. on Monday at Tancarville, and arrive back in London by 10 a.m. on Tuesday.

LIST OF LEPIDOPTERA TAKEN AT TANCARVILLE, JUNE 14TH TO 16TH, 1890.

RHOPALOCERA.—*Pieris brassicæ* and *P. rapæ*. *Euchloë cardamines*. *Gonopteryx rhamni*, a few small larvæ on buckthorn. *Argynnis selene*. *Vanessa urticæ*. *V. cardui*, one very worn female; deposited seven eggs in a chain. *Melanargia galatea*, larva. *Pararge egeria* and *P. megæra*. *Epinephele ianira*. *Thecla rubi*. *Lycæna icarus*. *Syrichthus malvæ*. *Nisoniades tages*. *Hesperia sylvanus*.

HETEROCERA.

BOMBYCES.—*Zygæna filipendulæ*, one larva about half-grown. *Hylophila prasinana*, two specimens: these, from their splendid condition, appeared to have just emerged from pupæ; one example has very distinct streak and blotches of red on the costa and inner margin of fore wing. *Calligenia miniata*, a female; deposited a number of eggs. *Lithosia sororcula* (= *aureola*). *Euchelia jacobææ*. *Arctia villica*. *Spilosoma lubricipeda* and *S. menthastris*. *Hepialus hectus*. *Porthesia similis* (= *auriflua*). *Leucoma salicis*. *Dasychira pudibunda*. *Orgyia antiqua*, larva. *Bombyx neustria*, larva, common. *B. quercus*, larva. *Odonestis potatoaria*, larva. *Dicranura vinula*, one very small larva. *Pygæa pigra* (= *reclusa*), larvæ, also very small.

NOCTUÆ.—*Thyatira batis*, at sugar. *Moma orion*, sitting among herbage. *Acronycta psi*, at sugar. *A. rumicis*. *Gortyna ochracea*, larvæ in stems of hemp agrimony. *Xylophasia rurea*, at sugar. *Pachetra leucophæa*, one very fresh example taken at exuding sap of birch tree; on each side of this birch were other trees which had been sugared. *Apamea basilinea*, at sugar. *Miana strigilis*, at sugar. *Rusina tenebrosa*, at sugar. *Agrotis exclamationis*, at sugar. *Noctua brunnea* and *N. festiva*, at sugar. *Triphæna pronuba*, at sugar. *Tethea retusa*, larva, on willow. *Euplexia lucipara*, at sugar. *Aplecta prasina* (= *herbida*) and *A. nebulosa*, at sugar. *Hadena thalassina* and *H. contigua*, at sugar. *Cucullia verbasci*, larvæ common on *Verbascum* and *Scrophularia*; many very small, a few nearly full grown. *Chariclea umbra*, at sugar. *Erastria venustula*, beaten out of undergrowth in the wood above Castle. *E. fasciana* (= *fuscula*), disturbed

from herbage at the edge of wood below Castle. *Euclidia glyphica*. *Rivula sericealis*. *Zanclognatha grisealis*. *Pechypogon barbalis*. *Hypena proboscidalis*.

GEOMETRÆ.—*Epione advenaria*, among bilberry above the Castle. *Rumia luteolata* (= *cratægata*). *Metrocampa margaritaria*. *Boarmia repandata*, not common; one example of var. *conversaria* sitting on the cliff, but quite beyond reach. *B. consortaria*. *Tephrosia luridata* (= *extersaria*). *Iodis lactearia*. *Zonosoma linearia* (= *trilinearia*). *Asthena luteata* and *A. candidata*. *Acidalia ornata*. *Cabera pusaria* and *C. exanthemata*. *Bapta bimaculata* (= *taminata*). *Panagra petraria*, almost passé. *Minoa murinata* (= *euphorbiata*). *Abraxas grossulariata*. *Lomaspilis marginata*. *Larentia viridaria* (= *pectinitaria*). *Eupithecia linariata*, *E. plumbeolata*, and *E. castigata*. *Hypsipetes trifasciata* (= *impluviata*). *Melanippe montanata*, *M. galiata*, and *M. fluctuata*. *Anticlea rubidata*. *Camptogramma bilineata*. *Cidaria corylata*. *Anaitis plagiata*.

PYRALIDES.—*Scoparia ambigualis*, *S. cembræ*, and *S. dubitalis*. *Pyrausta aurata* (= *punicealis*) and *P. purpuralis*. *Ennychia octomaculata*. *Eurhynpara urticata* (= *urticalis*). *Scopula olivalis*. *Botys fuscalis*. *Ebulea crocealis*. *Perinephelè lancealis*.

PTEROPHORI.—*Platyptilia bertrami* and *P. gonodactyla*. *Mimæseoptilus pterodactylus* (= *fuscodactylus*). *Leioptilus microdactylus*. *Aciptilia pentadactyla*. *Alucita hübnéri*? *Crambus pratellus*, *C. pascuellus*, and *C. hortuellus*. *Rodophæa consociella*, larvæ.

TORTRICES.—*Tortrix ribeana* and *T. viridana*. *Argyrotoza conwayana*. *Penthina pruniana* and *P. ochroleucana*. *Hedya ocellana* and *H. dealbana*. *Aspis udmanniana*, larvæ. *Sericoris urticana*. *Roxana arcuana*. *Orthotania striana*. *Sciaphila subjectana*. *Phoxopteryx myrtillana* and *P. lundana*. *Grapholitha penkleri*. *Batodes angustiorana*, one worn male specimen. *Pædisca profundana*. *Ephippiphora brunnichiana*. *Carpopcapsa grossana*. *Stigmonota nitidana* (= *redimitana*) and *S. flexana*. *Dicrorampha politana*, *D. petiverella*, and *D. plumbagana*. *Catoptria hypericana*, common. *Symæthis oxyacanthella*. *Xanthosetia hamana*. *Chrosis alcella* (= *tesserana*, fine and well marked). *Conchylis straminea*.

TINEÆ.—*Endrosis fenestrella*.

Besides Lepidoptera, many species of insects belonging to other Orders were met with; but, excepting the beetles, we did not secure as many samples as we might have done. Mr. Billups has been good enough to identify the specimens taken, and has reported on them as follows:—

The Coleoptera are represented by 39 species, ranging from the Cicindelidæ down to the Chrysomelidæ.

Cicindela campestris, L., was the only species met with representing the first-named Family, and appeared fairly plentiful. *Anchomenus parumpunctatus*, F., *Amara lunicollis*, Schiod., and *Harpalus ruficornis*, F., being the representatives of the Carabidæ: of these there was only one specimen of each taken. Of the Staphylinidæ two species only were met with, — *Philonthus politus*, F., and *P. marginatus*, F., and these sparingly; the Coccinellidæ being represented by several specimens of *Coccinella 14-punctata*, L. Among the Scarabæidæ, *Aphodius fossor*, L.,

and *A. hæmorrhoidalis*, L., two specimens only, but the deficiency was well made up by the abundance of *Hoplia philanthus*, Sulz. A type of *Agrilus angustulus*, Ill., represented the Buprestidæ; whilst a specimen each of *Athous hæmorrhoidalis*, F., and *Limonius minutus*, L., did duty for the Elateridæ; the representatives of the Telephoridæ being a solitary male of *Drilus flavescens*, Ol., male and female of *Telephorus flavilabris*, Fall., and a male of *Malachius bipustulatus*, L. *Helops striatus*, Fourc., was somewhat plentiful among the Tenebrionidæ, while the Pyrochroidæ had a single representative in a male of *P. serraticornis*, Scop. Several specimens of both sexes of *Ædemera nobilis*, Scop., and *Æ. lurida*, Marsh, appeared for the Ædemeridæ; the deputies of the Curculionidæ being *Otiorynchus tenebricosus*, Hbst., *O. picipes*, F., *Phyllobius alneti*, F., *Liophlæus nubilus*, F., *Barynotus obscurus*, F., and *Attelabus curculionides*, L., several specimens of each. The Cerambycidæ were represented by five species, — namely, *Agapanthia lineaticollis*, Don., of which there were several examples of both sexes; *Saperda cascharias*, L., a type only; *S. populnea*, L., several specimens; and one each of *Rhagium inquisitor*, F., and *Pachyta cerambyciformis*, Schor. The Chrysomelidæ were represented by a pair of *Timarchia lævigata*, L., and one specimen of a species closely allied to it, but which I have not yet been able to determine; a single specimen of *Cryptocephalus aureolus*, Suf., also a type of *Chrysomela polita*, L. Of the genus *Lina* there were several specimens of *L. populi*, L., while the remainder consisted of one specimen each of *Gonioctena olivacea*, Forst., *Haltica coryli*, All., and *H. ericeti*, All.

Several fine specimens of Homoptera were also met with in *Triecphora sanguinolenta*, Panz.,* while the Diptera had a representative in a beautiful specimen of the genus *Syrphidæ*. A very fine female of *Trogus alboguttatus*, Gr., represented the Family of Ichneumonidæ.

CONTRIBUTIONS TO THE ENTOMOLOGY OF THE PORTSMOUTH DISTRICT.

BY W. T. PEARCE.

COULD we compare a list of the fauna of this district of fifty years ago with one of the present time, we should find that modern improvements(?) had exterminated many interesting forms of life from our midst.

Fifty years ago Portsmouth and Portsea were surrounded by a wall, on which seven species of ferns were to be found; Southsea and Landport, by fields and market gardens. Southsea Common was a marsh, the home of rabbits and occasional hares;

* This insect is abundant all over the district.

in summer the haunt of the nightjar and many warblers; and in winter a hiding-place for the majority of our species of ducks. *Lycæna corydon* could then be taken here, and *Aporia cratægi* was common in Elm Grove. (*Vide* a paper read by Mr. H. Moncreaff before the P. and G. Natural Science Society.)

The wall was demolished nearly twenty years ago; of the ferns I have only found three species on the island. Southsea has become a well-known watering-place, and Landport the busiest part of the town. The rabbits have a feeble hold on the north of the island; hares are very scarce; the nightjar I have never seen or heard here. *L. corydon* occurs very sparingly on Portsdown Hill, and *A. cratægi* has been extinct for twenty years.

My notes are taken from a list of the fauna of the district, compiled by myself and members of the Portsmouth and Gosport Natural Science Society. The district proper is the whole of the land south of Portsdown Hill, enclosed by parallel lines drawn from the east and west ends to the shore; but I shall not confine myself strictly to these limits, as very little has been written on the insects peculiar to this district.

The Rhopalocera are divided among the several families, as follows:—Pieridæ, 8 species; Nymphalidæ, 13; Apaturidæ, 1; Satyridæ, 8; Lycænidæ, 10; Erycinidæ, 1; Hesperiidæ, 5: total, 46 species. Two of them are now extinct, thus reducing the total to 44 species, all of which are to be found within ten miles of Portsmouth Town Hall.

PIERIDÆ.

Aporia cratægi.—Once common in Elm Grove, Southsea, but has now been extinct for about twenty years.

Pieris brassicæ.—Common. In the evening of August 8th, 1887, in Alder Marsh, near Gosport, Mr. T. H. Larcom and myself stood on one spot, and without moving counted, within a space of not more than six square feet, over two dozen (I believe it was twenty-nine) specimens of this species and *P. rapæ*, which were resting for the night on the bramble bushes. A few days previously I counted over fifty white butterflies in the Bury Road; they were, no doubt, a portion of the swarm that visited the southern counties during the autumn of that year. The larvæ of *P. brassicæ* and *P. rapæ* were very numerous in October and November, 1888, at Gosport. *P. rapæ*.—Quite as common as *P. brassicæ*. *P. napi*.—Common, but rarely so common as *brassicæ* and *rapæ*. *P. daphnidice*.—Portsdown Hill is the only locality in the district where this insect has been taken. Mr. J. J. Moore took two specimens here; Mr. H. Moncreaff, one; Mr. Taylor, one; a fifth is said to have been taken by another collector; and a sixth was seen by Mr. Larcom and myself on some chalky ground, August 22nd, 1886. I am unable to obtain the dates of the above captures, but none are very recent.

Euchloë cardamines.—Generally common throughout the district. I have several specimens with the inner margin sulphur-yellow. A few years ago Mr. Larcom obtained a male with an orange blotch on the under wing near the hind margin; so far as I can discover it is not a pupal stain.

Colias edusa.—May be met with throughout the district nearly every year. It was very abundant during the last *edusa* year, and since then was most abundant in 1885, when Mr. Larcom and myself met with seventy-five specimens. In 1886, twenty-seven specimens were taken, but none in 1887; in 1888, eight only, and those not in the district; in 1889, thirteen specimens. *C. hyale*.—Scarce; a specimen on Portsdown, August 16th, 1885, Mr. Larcom.

NYMPHALIDÆ.

Argynnis selene and *A. euphrosyne*.—Common in woods north of Portsdown Hill. In May, 1887, Mr. Larcom found a variety of *A. euphrosyne* in Stakes Wood, the silver spots on the hind wings being very large and almost confluent; the black spots on the upper side formed lines, converging from the centre. *A. adippe*.—Occurs some years rather freely in Stakes Wood. In 1881 it was almost impossible to walk through the coverts and see a thistle-head unoccupied by one or more specimens. It also occurs in Havant Thicket and Scratch-face Lane, Stakes. The woods at Southwick and the Forest of Bere are also probable localities. *A. paphia*.—In the same localities as *A. adippe*. An old collector, Mr. H. Shelston, tells me he once found the variety *valesina* in Stakes Wood; neither Mr. Larcom or myself have found it nearer than Lyndhurst. Several specimens of the type were taken years ago at Great Salterns, by Mr. J. J. Moore. I am sorry to say Great Salterns and Highgrove, the only happy hunting-grounds left on Portsea Island, were closed to the public in 1889.

Melitæa aurinia (artemis).—The only locality in this district is Purbrook Common. In 1883, it was abundant; in 1884, it was scarcer; in 1885 and 1886, not one was to be seen; in 1887, about twelve females were seen by Mr. Larcom and myself; in 1888 and 1889, none; on May 26th of the present year, I hunted for more than an hour, and did not meet with a single specimen, and I have not heard of any being seen this season.

Vanessa polychloros.—This insect appears to be disappearing altogether from this district. In 1880, Mr. Larcom took a brood of larvæ at Gosport, and neither of us have seen the species there since. Although stray specimens have occasionally been reported to me from other parts of the district, I have not observed *polychloros* since August, 1883, when I saw two specimens at Warblington, near Havant. *V. urticae*.—Usually common; often abundant. *V. io*.—Often common; but rarely so numerous as *V. urticae* and *V. atalanta*. *V. antiopa*.—One caught at Cosham, by Mr. Tranton, July 29th, 1872. Recorded by Mr. Taylor, Entom. vi. 192. *V. atalanta*.—Common; often abundant. *V. cardui*.—Most eccentric in its appearance. Very abundant in 1879, common in 1880 and 1881, very scarce in 1882 and 1883, common in 1884 and 1885, scarce in 1886, none in 1887, a few in 1888, and a few hibernated specimens only in 1889 (the above are my own experiences only). *V. c-album*.—Recorded in Newman's 'Butterflies and Moths,' by the late Mr. Buckler, as occurring at Farlington. The larva was taken at Purbrook, by Mr. J. J. Moore, in 1886. Neither Mr. Larcom or myself have yet met with this species in any part of the district.

Limenitis sibylla.—This species is probably to be found in all the woods in the district. It is sometimes common in Stakes Wood; I know a collector who took over forty specimens there in one day. The other localities are Havant Thicket; Scratch-face Lane, Stakes; the woods at Southwick; Forest of Bere; and the Grange Wild Grounds, Gosport.

APATURIDÆ.

Apatura iris.—Mr. R. Stent has seven specimens, taken by himself at Southwick; it has been seen by Mr. Larcom and myself, and captured by Mr. Leech, in Stakes Wood. In 1888 a specimen was taken by Mr. Larcom in the Forest of Bere.

SATYRIDÆ.

Melanargia galatea.—I have but one record of this species from Gosport, and that only of a single specimen met with many years ago by Messrs. Lacey, Woodman, and Stevens, and captured by the latter. It is common at Fort Purbrook, Portsdown Hill; it occurs in Stakes Wood and Scratch-face Lane; I once met with it near Leigh Park. There are probably other places in the district that I am not yet acquainted with.

Pararge egeria.—Local, and rarely common. Stakes Wood; Scratch-face Lane, Stakes; Havant Thicket; and Southwick. *P. megara*.—Common throughout the district.

Satyrus semele.—Portsdown Hill, not common; Hayling Island and Browndown, common.

Epinephele ianira.—Common throughout the district. I have a very curious male, taken on Portsdown Hill in 1888; the right upper wing appears to have been tied round the centre in some way whilst developing. *E. tithonus*.—Common in every hedgerow. *E. hyperanthes*.—Common in the woods and lanes north of Portsdown Hill. The variety *arete* has been taken at Crook-horn, by Mr. Larcom and myself.

Cænonympha pamphilus.—Common throughout the district. Specimens having the ocelli on the under side of the lower wings well developed are occasionally taken.

LYCENIDÆ.

Thecla quercus.—In woods throughout the district. It occurs, or used to occur, in a small copse at Great Salterns, Portsea Island. *T. w-album*.—One at Southsea many years ago, Mr. H. Moncreaff. *T. rubi*.—Local. Grange Wild Grounds, and Browndown, Gosport; Stakes Wood. One at Eastney, W. T. P.

Polyommatus phloxas.—Generally distributed, and common in places. A specimen of the var. *schmidtii* was taken some years ago by Mr. King, at Highgrove; it has since been destroyed by mites.

Lycæna ægon.—Mr. Stent tells me this species used to be common on Portsdown Hill; it is now very scarce. *L. astrarche (agestis)*.—Portsdown Hill, not common; Scratch-face Lane, Stakes, one, W. T. P. *L. icarus (alexis)*.—Common. I have two males, with the wings partly white, from Portsdown. Mr. Larcom has a specimen of what I take to be the var. *icarinus* from the same locality; examples showing some variation in the markings of the hind wings are occasionally taken. *L. corydon*.—This species used to occasionally occur on Southsea Common; it is now only to be found on Portsdown Hill, and there only in small numbers. In August, 1888, I counted fourteen females and three or four males; and on August 4th, 1889, I saw eleven females, but no males; this was the only date last year that *corydon* was met with, so that I believe there is reason to think this species will soon be entirely eliminated from our district. Mr. McArthur told me of another place on the hill where it was said to occur, but neither Mr. Larcom nor myself could find it there. *L. argiolus*.—Springly. Scratch-face Lane, Stakes; common, Grange Wild Grounds,

Gosport. A few years ago Mr. Larcom had a brood of larvæ on the ivy in his garden, in Shaftesbury Road, Gosport. *L. minima (alsus)*.—Portsdown Hill, common, but rather local.

ERYCINIDÆ.

Nemeobius lucina.—In glades in Stakes Wood, not common. A few years ago Mr. Larcom and myself met this species in a meadow between Stakes and Purbrook, but only once.

HESPERIIDÆ.

Syrichthus malvæ (alveolus).—Purbrook Common, few; Stakes Wood, and Scratch-face Lane, Stakes, common.

Nisoniades tages.—Portsdown Hill, few, eastern end, north of Portsdown Hill; common, in woods and lanes. I have never found it south of the hill.

Hesperia thaumas (linea).—Most abundant throughout the district in and near woods. *H. sylvanus*.—Generally distributed, and generally more abundant throughout the district than *H. thaumas*. *H. comma*.—Used to occur on Portsdown Hill, near Paulsgrove. The spot where it was most abundant was taken into the chalk-pit about ten years ago, and the insect has now disappeared. Mr. Larcom and myself paid several visits to the spot during the past six years in hopes of finding this species, but were always unsuccessful.

The Heterocera of this district I estimate at about 800 species. A list of these I hope to publish at no distant date; that is to say, as soon as I can obtain definite information respecting doubtful species, rarities, and other species not on my list.

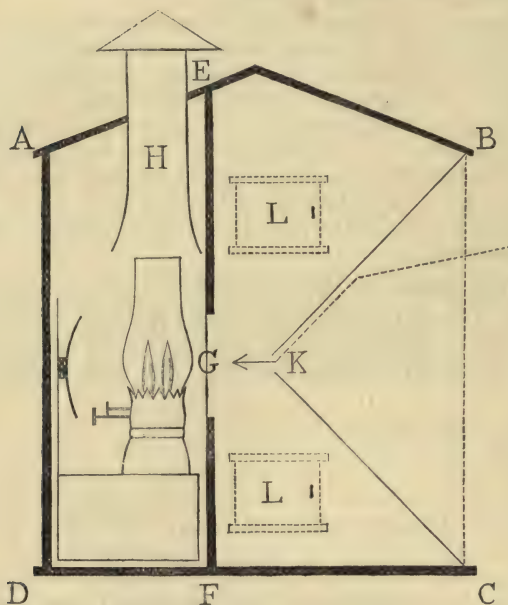
101, Mayfield Road, Seafield, Gosport, June, 1890.

A SUCCESSFUL MOTH-TRAP.

By W. M. CHRISTY, F.E.S.

DURING this and the last three seasons I have used a moth-trap which I had constructed from my own designs, and as it has proved so useful in obtaining me many specimens of Lepidoptera, I thought some account of it, and the work it has done, would interest the readers of the 'Entomologist.' The accompanying diagram of the trap, I think, explains itself; I will, however, venture to describe the details. A, B, C, D, is a box, having a partition, E, F, to separate the lamp-chamber from the moth-chamber. In the centre of this partition is a glass window, G, through which the lamp shines. The box is open at B, C, and there is a door in the back, A, D, through which the lamp may be taken out for cleaning and trimming. There is a chimney, H, coming out through the top to carry off the heat and smoke of the lamp; around the lower part of the lamp-chamber there are ventilation holes to admit air to the lamp and prevent the box becoming very hot.

B, K, and C, K, are two sheets of glass converging from the front of the box, down from the top corner, B, and up from the lower corner, C, toward a point, K, in the centre where they do not quite meet, but provide a long narrow entrance across the centre of the box through which the moths can pass in the direction of the light, towards which they are guided and assisted by the converging plates of glass. The opening I find most convenient is about $1\frac{1}{4}$ in. wide. When inside the box the moths are not very likely to find their way out again through the slit K.



The moth-chamber referred to above is the space, E, F, C, K, B; and having got the moths in, the next thing is how to get them out when the trap is examined next morning. At first I had the roof of the box to open as a lid, and the plates of glass in the front to slide out, but the objection to both these plans is that the opening is so large that the moths may fly out while you are trying to box them inside the trap. I now have small sliding doors, (L, L), two on each side, only large enough to admit the hand and killing-bottle. This arrangement is safer than the other, but not very convenient. I have no arrangement for automatically killing the moths like that described on p. 103 of Dr. H. G. Knagg's little book, but I am thinking of trying the effect of a bag of bruised laurel leaves placed inside the moth-chamber. The killing-drawer attached to the American moth-trap above alluded to seems to me too intricate for practical

work, and any one setting up a moth-trap which has to stand out of doors in all weathers will soon find that the more simple it is in its construction the better. The doors, drawers, lids, &c., are sure to warp, and either stick or become loose, and, in fact, to be a general source of trouble and annoyance.

The lamp I use is an ordinary paraffin duplex lamp with reflector, such as are used to hang up against walls. Care must be taken that the flame of the lamp should be in the centre of the box, and on a level with the opening, *k*. It may be asked, What condition are the moths in when you visit the trap in the morning? To this I reply that, taking them all round, they are in better condition than I expected they would be before I had tried the trap. On an average the specimens are nearly as good as those attracted by light into a dwelling-house; these last have to be netted in the room, and are liable to damage themselves against the ceiling and about the lamp before they are caught.

Looking at my section of the box it will be seen that a good deal of the moth-chamber is in shadow, owing to the partition, *E, F*, being opaque, *i. e.*, wood, and only having a small window in its centre. This gives the moths a chance of settling down quietly out of sight of the lamp, and I think that many of them do so. Many of the moths taken in the trap are absolutely perfect. I do not think that, as a rule, the Geometers injure themselves at all inside the trap. Of course there are exceptions: *Melanippe montanata*, for example, generally flies about and spoils itself.

On the other hand I have this season taken about twenty specimens of *Odontopera bidentata*; most of these were absolutely fresh, and none of them were worn, so that I believe I found them in the same condition as when they entered the trap. Most of the Bombyces and Noctuæ spoil themselves more or less. Still, there are a good many to be found quite perfect, without the fringes being in the least frayed.

As to numbers caught, the trap is very seldom empty; I often find a dozen moths within and not unfrequently more. I have taken as many as fifty in one night.

I consider this kind of moth-trap a most valuable adjunct to the usual means of collecting Lepidoptera; and as it can be used *every* night, and *all* night, with only the trouble of lighting it once in the evening, the advantages are obvious.

I append a list of moths taken in my trap, which has been set either in or close to large woods of oak, beech, and the usual kinds of copse and underwood growing upon a chalk soil.

At Emsworth, in May, June, and July, 1887—90:—

S. ligustri, *N. mundana*, *E. jacobææ*, *S. lubricipeda*, *S. menthastri*, *Hepialus*, one, June 5, (*sylvanus* or *lupulinus*), *D. pudibunda*, *D. falcataria*, *L. camelina*, *N. trepida*, *P. bucephalus*, *D. coryli*, *A. ligustri*, *L. conigera*, *L. lithargyria*, *L. pallens*, *X. monoglypha*, *M. persicariæ*, *R. tenebrosa*, *A.*

segetum, *A. cinerea*, *N. triangulum*, *N. festiva*, *T. gothica*, *D. carpophaga*, *A. advena*, *H. dentina*, *H. adusta*, *T. pastinum*, *E. advenaria*, *M. margaritaria*, *E. dolobraria*, *P. syringaria*, *S. bilunaria*, *O. bidentata*, *C. lichenaria*, *H. abruptaria*, *B. repandata*, *B. roboraria*, *C. biundularia*, or *C. crepuscularia*, *C. luridata*, *C. punctularia*, *G. vernaria*, *I. lactearia*, *E. porata*, *E. linearia*, *E. annulata*, *L. didymata*, *A. remutata*, *A. aversata*, *A. marginepunctata*, *T. amataria*, *C. pusaria*, *A. pictaria*, *P. petraria*, *N. pulveraria*, *L. viridaria*, *E. plumbeolata*?, *E. nanata*, *E. satyrata*, *M. albicilata*, *M. unangulata*, *M. montanata*, *M. fluctuata*, *A. badiata*, *A. derivata*, *C. ferrugata*, *P. tersata*, *P. vitalbata*, *C. corylata*, *C. russata*, *C. dotata*.

The following moths were taken with the trap on the coast of Kintyre, Argyllshire, between Aug. 2nd, and Sept. 2nd, 1889:—

L. impura, *T. fulva*, *H. nictitans*, *H. micacea*, *C. graminis*, *L. testacea*, *M. literosa*, *C. alsines*, *A. tritici*, *A. cursoria*, *A. præcox*, *N. xanthographa*, *T. janthina*, *X. fulvago*, *X. flavago*, *E. lutulenta*, *P. chrysitis*, *S. anomala*, *R. luteolata*, *C. elinguaris*, *A. bisetata*, *O. filigrammaria*, *L. didymata*, *E. subfulvata*, *T. variata*?, *C. immanata*, *C. testata*.

There are generally some *Micros* in the trap but I cannot name them; neither can I specially refer to the various kinds of flies found therein.

Watergate, Emsworth.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

CAPTURES AT THE "SALLOWS."—The salallows in this district were out early this year, some bushes being in full bloom by the 15th March. I was not able, unfortunately, to pay them a visit till the 8th April, and then the insects had become scarce, my only captures being 1 *Teniocampa gracilis*, 3 *T. stabilis*, 1 *T. gothica*, and 1 *T. pulverulenta (cruda)*. Some friends of mine, however, went to High Beech on the 15th March, and found insects in great abundance and fine condition, the captures being *T. stabilis* (very common), *T. instabilis* (common), *T. gothica* (very common), *T. cruda* (very common), *T. vaccinii* (common), *T. munda* (rare, 2 or 3 specimens only). Solitary specimens of *T. stabilis*, *T. gothica*, *T. gracilis*, and *T. instabilis*, have also been taken with the net, during this month, and in fine condition.—C. NICHOLSON; 202, Evering Road, Upper Clapton, N.E., May 30, 1890.

THE CHEMISTRY OF INSECT COLOURS.—I am much obliged by the references quoted by Mr. Cockerell, in his note on the subject last month (*Entom.* 200), some of which references he had already been kind enough to apprise me of by a private communication. Regarding Mr. Hopkins' investigation, it is quite true that I had overlooked the account given in the 'Chemical News' of last August, and this owing to the fact that I was out of England when the number in question appeared, and had apparently omitted to look up the back numbers on my return. Mr. Hopkins' paper was read before the Chemical Society, but has not, so far, been published in their journal; otherwise, of course, I should have seen it in full there. I *did*, however, see a brief extract of it in one of the scientific journals, but this abstract was so meagre as to have given me a very imperfect knowledge of the nature and extent of Mr. Hopkins' work. Had I been better informed on the subject, I should have made some reference to his work in the first

section of my article. As it is, however, we seem to be working on by no means the same lines. Of M. Bergé's work, I am at present entirely ignorant. With regard now to the *questio vexata* of the cyanide effect. As Mr. Cockerell will have seen by last month's contribution, my experiments have all been made with *solution*; and a solution of potassic cyanide ought, of course, to be far more efficacious than a cyanide-bottle. However, acting on Mr. Cockerell's hint, I have made a set of experiments in a damp and heated cyanide-bottle. The details will be best reserved until, in my article, I come to speak of the *Colias* colours. At present it is sufficient to say that I have got *no red*, so far. Mr. Cockerell's little theory of the impurities does not, I am afraid, help matters much. Such substances as carbonate, sulphate, or chloride of potash, &c., would, even in *concentrated solution*, have probably no effect at all on insect colours; how they could act when in a solid mixture, either cold or warm, I am at a loss to understand; and this remark applies with still more force to silica. As to potassic ferrocyanide, I may refer Mr. Cockerell to my last month's contribution; if it had any effect at all in *solution*, it would turn *Colias* white; mixed with solid cyanide, it would be as harmless as the carbonate, &c. As to ammoniacal compounds, similar remarks would hold good; but ammonia itself in solution has a very powerful effect on *Colias* yellow, but it turns it *pure white* (see next month). The mere vapour of strong ammonia is very slow to act, but eventually a similar effect is produced. So far, therefore, we seem no nearer getting concordant results as to this reddening of *Colias*. Finally, with regard to the *white* of *Lycenidæ*, I think Mr. Cockerell will find that dealt with in this month's section of my article (see p. 219).—F. H. PERRY COSTE; Ravenshoe, Burnt Ash Hill, June 8, 1890.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*June 4th*, 1890.—The Right Hon. Lord Walsingham, M.A., F.R.S., President, in the chair. Mr. George William Carter, M.A., F.L.S., of Lime Grove, Knottingley, Yorkshire; and Mr. R. Newstead, of The Museum, Chester, were elected Fellows; and Mr. Oliver Goldthwait and Mr. John W. Downing were admitted into the Society. The Secretary exhibited, on behalf of Mr. J. Edwards, Norwich, two specimens of *Ilybius subaneus*, Er., and a single specimen of *Bidessus unistriatus*, Schr. Mr. Champion alluded to the fact that the only recorded British specimens of the first-mentioned beetle had been taken many years ago at Peckham. The species is very closely allied to *I. fenestratus*, F., but the posterior tarsi of the male have the joints externally margined at their lower edge, whereas in the male of the last-mentioned species they are not margined; this character was very plain in the male specimen sent by Mr. Edwards. Lord Walsingham, in alluding to the exhibit, referred to the list of Norfolk Coleoptera compiled some years ago by Mr. Crotch, which appears to have been lost sight of. Mr. Verrall exhibited a specimen of a fly in amber, belonging to a genus allied to the genus *Psychoda*. Mr. M'Lachlan alluded to the damage done by insects to orange-trees in Malta, and stated that the Rev. G. Henslow had lately been studying the question; one of the chief depredators was the widely-spread "fly," *Ceratitis citriperda*, well known as devastating the orange. He found, however, that another and more serious enemy was the larva of a large Longicorn beetle (*Cerambyx*

miles, Bon.), which bores into the lower part of the stem and down into the roots, making large galleries; in all probability the larva, or that of an allied species, is the true *Cossus* of the ancients. Lord Walsingham stated that a species of *Prays*, allied to *P. oleellus* and our common *P. curtisellus*, was known to feed in the buds of the orange and lemon in Southern Europe. Mr. Pascoe, Mr. Champion, and others took part in the discussion which followed. The Secretary, on behalf of Miss Carr, exhibited a portfolio of drawings of Indian Lepidoptera and their food-plants. The following papers were communicated, and were read by the Secretary:—"Notes on the species of the families Lycidæ and Lampyridæ contained in the Imperial Museum of Calcutta, with descriptions of new species, and a list of the species at present described from India," by the Rev. H. S. Gorham; and "A Catalogue of the Rhopalocerous Lepidoptera collected in the Shan States, with notes on the country and climate," by Mr. N. Manders, Surgeon, Medical Staff. The latter paper contained a very interesting description of the chief physical features of the Shan States and neighbouring parts of Burmah.—H. GOSS & W. W. FOWLER, *Hon. Secs.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—May 22nd, 1890.—J. T. Carrington, F.L.S., President, in the chair. Mr. S. Edwards exhibited Lepidoptera from China and India, including examples of *Papilio nigarus*; also Coleoptera, belonging to the family Sagra, from Africa. Mr. Hawes, ova of *Gonopteryx rhamni*, L., and made some interesting remarks on the way the eggs were deposited. Mr. Frohawk also showed a microscopical drawing of the ovum of the same species, and a coloured drawing of a small plant of buckthorn about three inches in size, upon which he had found seven ova. Mr. Nussey exhibited living larvæ of *Geometra papilionaria*, L. Mr. C. Fenn, a very long series of *Saturnia pavonia*, L., reared from eggs obtained by a female captured at Bournemouth: the specimens were exceptionally large, and the males very brilliantly coloured. He also showed long series of both sexes of *Spilosoma mendica*, Clerck., which he stated were reared by him from ova obtained from a female taken at Eltham, the larvæ being fed on the common broad-leaved plantain; forty-three imagines were bred—twenty-one male and twenty-two female. The females varied little from the ordinary type, with one exception, which was curiously blotched with dark grey on the left superior wing; the males varied from the usual English type up to a dull pale yellowish grey, and quite 50 per cent. diverged more or less from the usual form. The pupæ had been exposed to the weather in a very cold and damp spot, which he thought rather bore out Mr. Tutt's theory that moisture is the cause of melanism or colour variation. Mr. R. Adkin remarked that these specimens showed more variation than was usually found in specimens of this species from English localities, and asked whether anything was known of the male parent, and whether the female differed from the type. In answer, Mr. Fenn said he knew nothing of the male, and there was nothing special about the markings of the female parent. Mr. Tutt pointed out that the variation in the male was somewhat similar to the Irish form known as var. *rustica*. Some observations were made by Messrs. South, Tutt, Carrington, Adkin, and Fenn, on pupæ of Lepidoptera laying over for two or more years.

June 12th, 1890.—The President in the chair. Messrs. G. B. Rye, of Putney; H. McArthur, of Brompton; and A. Ward, of Brighton, were elected members. Mr. Wellman exhibited *Acronycta strigosa*, bred from

pupæ received from Cambridge; *Nemeobius lucina*, L., bred from ova; and *Eupithecia venosata*, Fb., which had been two years in pupæ, and were received from the Isle of Man. Mr. Nussey, *Acronycta myricæ*, Gn., from Rannoch. Mr. F. Warne, *Nemeobius lucina*, L., *Macroglossa fuciformis*, L., &c., from Horsley. Mr. Robson, a banded variety of *Zonosoma punctaria*, L. Mr. Tugwell, *Nemoria viridata*, L., and a prettily marked male resembling the Rannoch form of *Biston hirtaria*, Clerck. Mr. R. Adkin, small and brightly marked specimens of *Herbula cespitalis*, Schiff., from the Land's End, on behalf of Mrs. Hutchinson; also larvæ of *Larentia cæsiata*, Lang, from the Grampian Hills, feeding on heather; and cases and imagines of *Psyche villosella*, Och. Mr. R. Adkin further showed nests of a species of wasp attached to heather from Bournemouth, and from which the imago had just emerged. Mr. Billups said the species was *Eumenes coarctata*, L., one of the solitary wasps, and the only representative of the genus in Britain: he then described the habits of the insect, and exhibited various parasites belonging to the families Ichneumonidæ, Chrysididæ, Syrphidæ, and Staphylinidæ, to the attacks of which insects the Vespidæ are particularly subject. Mr. Billups also exhibited nests of solitary wasps from Borneo, with their maker; also a very fine nest of a social wasp, *Palopæus architectus*, St. Farg, with imago from Kentucky. Mr. Henderson, some abnormally large specimens of *Paniscus cephalotes*, Holmgr., bred from larvæ of *Dicranura vinula*.—H. W. BARKER, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—May 19th, 1890.—Mr. R. C. Bradley in the chair. Mr. P. W. Abbott showed *Trachea piniperda* and *Eupithecia abbreviata* from Sutton Park. Mr. G. W. Wynn showed *Trachea piniperda* from Marston Green, from which place it had not hitherto been recorded. A number of local captures of Lepidoptera were reported for entry in the book provided for the purpose of recording them.

June 2nd, 1890.—The President, Mr. W. G. Blatch, in the chair. Mr. G. W. Wynn showed *Bombyx rubi* from Sutton Park. Mr. H. M. Lee showed a small wasp, which was taken carrying off a large *Tipula*. Mr. R. C. Bradley showed a box of Tortrices. Mr. W. G. Blatch showed Coleoptera from Ludlow, new to the Midland list, as follows:—*Trechus longicornis*, *Perileptus areolatus*, *Homalota fragilis*, *H. longula*, *H. delicatula*, *H. subtilissima*, *Aecobius signaticornis*, *Lathrobium angusticolle*, *Medon ripicola*, *Thinobius linearis*, *T. longipennis*, *Acrulia inflata*, *Trichonyx märkelii*, and a species of *Scopæus*, which may be new. Mr. Blatch also showed *Homalota fallaciosa*, *Acidota crenata*, and *Mycetoporus angulatus*, from Sutton Park, the last being new to the Midland list. Mr. H. Stone showed galls on yew, also some on a species of *Abies*, the latter being apparently produced by a number of minute Acari, seated at the base of the leaves and causing the stem to swell.—C. J. WAINWRIGHT, *Hon. Sec.*

PENARTH ENTOMOLOGICAL SOCIETY.—This Society, formed in 1888, held its second Annual Exhibition and Conversazione on April 10th, in the Public Hall, Penarth. C. T. Vachell, M.D., of Cardiff, presided. The growing importance of the Society was manifested by the large gathering of scientists from the surrounding districts. The locality of Penarth is particularly rich in its Fauna and Flora; this, and the fact of there being no entomological section in the Cardiff Naturalists' Association, has contributed to the rapid growth of this Society, so as to render its reorganization on a larger basis desirable. Several gentlemen of position and

influence in the county have consented to become Vice-Presidents, and arrangements are in progress which—with the zealous prosecution of research shown by the members hitherto—augur a successful and useful future. At the meeting referred to a very large number of cases, containing specimens of local and exotic Lepidoptera and Coleoptera, were exhibited. Sir J. T. D. Llewellyn, Bart., contributed some of the gems of his magnificent collection, supposed to be the most complete in Wales, or the West of England; Mr. Evan John, J.P., of Llantrissant, sent a collection of the rarer Lepidoptera of Glamorganshire; Mr. G. C. Griffiths, of Bristol, forwarded some cases of exotic Lepidoptera: these, added to the extensive collections of several of the members, formed an Exhibition which has not hitherto been equalled in this part of the kingdom. During the evening the Rev. J. H. Hodson, B.A., gave an interesting address on the uses and pleasures of Entomological study, and referred to the destruction of the Scale Insect, in the orange groves of California, by the importation of *Coccinellidæ*. He also alluded to the pleasure derivable from the study of the habits of ants and beetles, and to the interesting topic of insect mimicry. Mr. J. Storrie, Curator of Cardiff Museum, displayed, by the aid of several microscopes, a number of beautifully prepared sections of insects, and other microscopic objects. The members of the Society are actively engaged in preparing a list of local Lepidoptera, which it is hoped will be of some value as a contribution to Entomological Science.

OBITUARY.

DR. R. C. R. JORDAN, late of Edgbaston, Birmingham, died on the 24th of May, at Teignmouth, Devon, his native place. His grandfather was a banker in that town; his father a solicitor, the head of a firm which still flourishes there. Dr. Jordan himself was born in 1825, and had therefore nearly completed his 65th year. He received his early education at Exeter Grammar School, whence he proceeded to King's College, London. Here he soon distinguished himself, carrying off, among others, the Warneford prize, and was shortly appointed house-physician to King's College Hospital. Later on, when in 1852 he took his M.B. degree, he was awarded the gold medal for proficiency in physiology. For thirty-three years Dr. Jordan practised as a physician in Birmingham, winning the esteem and friendship of high and low alike. For the necessitous poor, indeed, he had especial tenderness and regard; he often would return professional fees when he thought the circumstances of his patients rendered payment onerous; and there were perhaps few men in the profession—so writes the '*Birmingham Daily Post*,' from which many of the particulars about Dr. Jordan's life have been derived—who did more gratuitous work. Such a habit, though it brought practice and ensured gratitude, did not lead to an adequate professional income; and when at last his health gave way, and it became necessary for him to leave the Midlands, and seek rest and invigoration from the balmy air of his native place, the affection felt for him by his friends found vent in a private subscription, as a parting testimonial to the man who had spent himself so freely for the general good. Unhappily, as the event proved, the change came too late, and the hopes that had been indulged in of his recovery

have been disappointed. As a naturalist, perhaps, Dr. Jordan's name was not very familiar to the outside world; to those who knew him best his loss will be great. From his early boyhood he had been a lover of Nature, and a careful observer also. His father and grandfather before him were both good ornithologists, and began a work with coloured illustrations of the birds of Devon, but only one or two volumes were published. He himself had a thorough knowledge of the birds of his native county, particularly of the coast species. His first contribution to entomological literature was nearly fifty years ago, in Newman's old 'Entomologist' for 1842, being simply a record of insects, principally Micro-lepidoptera, taken by him when a boy on the coast near Teignmouth. Since then he had been steadily observing the habits not only of Lepidoptera, which was his special branch, but also of Hymenoptera, and had gradually, in consequence, amassed a goodly collection, both British and Palæarctic. He travelled abroad a good deal at various times, first trying Germany, then Switzerland, &c., and more recently Norway. He was, however, never what is known as a *Collector*. It would give him quite as much pleasure to see a rare creature alive as to have it in his collection, and much more to watch its habits in its native haunts; and he was thus much more a practical worker (if a quiet one) and a field naturalist than a cabinet naturalist. He was an old correspondent of Zeller's and Wallengren's, and also of other Continental entomologists, and never entertained the "insular preference" until recently so common among British entomologists. Dr. Jordan was also an excellent botanist (he took the gold medal for this in his College course in London), and has left a considerable herbarium of British and Swiss plants. His contributions to entomological literature were not voluminous: the principal ones that I have come across are enumerated below; but though his fame as an entomologist may be limited, to those who knew him best and mourn him most the memory of the man will remain.

"Ever the ashes of the just
Smell sweet and blossom in the dust."

Note on the singular situation of a bee's nest in snail-shells. Zool. 1843, p. 336, pl. 1.

Galls produced by *Cynips quercus-petiolis*. Trans. Ent. Soc. Lond. 1854, Ser. 2, pl. 3; Proc. p. 40.

List of Lepidoptera captured in the vicinity of Teignmouth. Entom. 1842, pp. 394—396.

Varieties of Lepidoptera and their causes. Ent. Mo. Mag. i. p. 53.

Aquatic habits of a Hymenopteron. E. M. M. i. p. 186.

Description of the larva of *Pt. brachydactylus*. E. M. M. i. p. 215.

A few days among the Micro-lepidoptera of South Devon. E. M. M. ii. p. 193.

Notes on double-brooded insects. E. M. M. iii. p. 20.

On the similarity of the insects of North America and England. E. M. M. iii. p. 41.

Notes on variation in Lepidoptera. E. M. M. iii. p. 251.

Note on *Pt. isodactylus*. E. M. M. iv. p. 30.

Notes on the larva of *Pt. plagiodactylus*, and on *Ellopiæ fasciaria* var. *prasinaria*. E. M. M. iv. p. 185.

- On the abundance of certain insects in certain years. E. M. M. v. p. 134.
- Scoparia zelleri* in South Devon. E. M. M. vi. p. 14.
- Parasites on Pterophori. E. M. M. vi. p. 138.
- Notes on the Skandnaviens Fjädermott of H. D. T. Wallengren. E. M. M. vi. pp. 119, 149.
- Four days at the Drachenfels. E. M. M. vii. p. 174.
- On the origin of British Lepidoptera. E. M. M. viii. p. 45.
- On a probably new species of *Platyptilus*. E. M. M. viii. p. 137.
- Notes on mimicry. E. M. M. viii. p. 251.
- On mounting small objects for microscopical observation. E. M. M. ix. p. 273.
- Note on the first recorded occurrence of *Thalpochares parva* in England. E. M. M. x. p. 40.
- Note on the purchase of European Lepidoptera. E. M. M. xii. p. 188.
- Notes on some Swiss Lepidoptera. E. M. M. xiii. p. 57.
- Notes on the Butterflies and Sphinges of Zermatt and vicinity, observed in June and July, 1878. E. M. M. xvi. p. 86.
- Irruption of *Vanessa cardui* and *Plusia gamma* into Devon. E. M. M. xvi. p. 196.
- Notes on the Lepidoptera of the Valais. E. M. M. xvii. p. 267.
- Comparison of the Pterophori of Europe and North America, suggested by Lord Walsingham's Pterophoridæ of California and Oregon. E. M. M. xviii. pp. 73, 117.
- On European species of Lepidoptera with apterous or subapterous females. E. M. M. xx. p. 219.
- Appeal on behalf of *Danaus chrysippus* and *Hypercompa hera*. E. M. M. xxii. p. 211.
- Review of 'British Butterflies and Moths,' by the late Wm. Buckler, Ray Society, vol. i. E. M. M. xxiii. p. 18.
- Note on the larva of *Notodonta torva*. E. M. M. xxiv. p. 9.
- Note on *Sesia conopiformis* and *Platyptilus fischeri*. E. M. M. xxiv. p. 42.
- Mamestra brassicæ* feeding on oak; Note on migration of insects. E. M. M. xxiv. pp. 63, 64.
- Note on small birds and the Lepidoptera eaten by them. E. M. M. xxiv. p. 86.
- An entomological ramble at Bergen, Norway, August 20th, 1887. E. M. M. xxiv. pp. 127—130.
- Note on *Parnassius delius* in Wales. E. M. M. xxiv. p. 185.
- Note on *Ephestia semirufa* in Devon forty years ago. E. M. M. xxiv. p. 274.
- A walk in Jersey. E. M. M. xxv. pp. 49—52.
- Melanism in Birmingham and South Devon. E. M. M. xxv. pp. 102, 103.
- Note on *Triphosa dubitata*. E. M. M. xxv. p. 136.
- Note on *Acidalia immorata*. E. M. M. xxv. p. 213.
- Tinea pallescentella* in Birmingham. E. M. M. xxv. p. 213.
- Lepidoptera of Norway. E. M. M. xxv. pp. 362, 363.
- Notes on some Lepidoptera captured in Norway. E. M. M. xxv. pp. 439—444.

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THE LIFE-HISTORY OF *DECLANA FLOCCOSA*.

BY G. V. HUDSON, F.E.S.

ON August 19th, 1889, I obtained a female of this common insect, at rest on a fence, which I conjectured had either hibernated during the winter or else recently emerged from a pupa. From this female I determined to try and obtain ova and rear the insect right through, in order, first, to learn the complete life-history; and, secondly, to observe the effect of different food-plants on the variation of the imago. For this purpose I divided the ova, of which I was fortunate enough to obtain about 100, into two equal lots, placing them in two separate cages, nos. 1 and 2, and feeding no. 1 on *Aristotelia racemosa*, and no. 2 on *Leptospermum ericoides*. The eggs of this insect when first laid are oval in shape and light green in colour, becoming bronzy a few days before the emergence of the larva.

The young larvæ, which appeared on September 20th, were very attenuated, with only ten legs. In colour they were greenish ochreous, striped with brownish pink, which was most apparent near the segmental divisions. Length, $1\frac{3}{4}$ lines. They were very active, and did not eat the egg-shells after emergence.

On October 3rd, the larvæ in cage 1 showed a decided advance over those in cage 2, and had developed a pair of rudimentary prolegs on the fifth abdominal segment; otherwise there were no observable differences between the two lots of larvæ. On October 14th, the larvæ in cage 1 had the two additional prolegs completely developed, and showed distinct traces of the fleshy filaments; those in cage 2 being about as far advanced as the others were on October 3rd. On October 25th, about one half of the larvæ in cage 1 had passed their last moult, and the following description was then made:—The body is subcylindrical in shape, much flattened underneath. In colour the larvæ are pale brownish pink, with numerous irregular brown markings, which in some individuals tend to form two broad subdorsal lines. The under

surface of the larva is pale green. Between this pale green under surface and the dorsal and lateral surfaces the fleshy filaments arise; they are pinkish brown in colour, and, as the larva lies closely attached to the stem of its food-plant, these filaments embrace it on either side, and thus help very materially to render the insect like a swelling in the stem. This is the invariable position of the larvæ when at rest. The larvæ in cage 2 are, on the average, considerably behind the others. They feed chiefly on the opening buds of the food-plant; they are somewhat paler in colour than those fed on *Aristotelia*.

On November 3rd, the larvæ in cage 1 were preparing to descend into the earth, while the others were just passing their last moult; so that it can be safely said that the *Leptospermum* had had the effect of retarding the majority of the larvæ to the extent of one moult behind those fed on the more succulent and nutritious *Aristotelia*.

The difference in colouring between the two lots of larvæ thus treated were, however, of the most trivial description; and I must say that this somewhat surprised me at first, as I had often taken the caterpillars of *Declana floccosa* from both plants in a state of nature, and observed the greatest divergence between them, those off the *Leptospermum* being a very pale ochreous brown, while those from the *Aristotelia* were very much darker, and often mottled with grey, like the stem of the plant. I am inclined to think that these differences have been gradually brought about by the larvæ feeding on the same plant for many generations, and thus the protective resemblances have been inherited and constantly improved through natural selection acting on each lot separately. I should mention that *Leptospermum* and *Aristotelia* do not generally grow near one another. The former plant is found in dry situations, such as the sides and tops of hills; while the latter grows in the damp gulleys, generally on the borders of streams. This circumstance would, of course, tend to prevent two races of *Declana floccosa*—one feeding on *Leptospermum* and the other on *Aristotelia*—from interbreeding, and thus the larval peculiarities adapted to each food-plant would naturally become still more pronounced. The imago of *D. floccosa* is extremely variable in a state of nature, as the following table will show:—

Var. 1.—Which I assume to be the type, has the fore wings pale greyish white, with numerous small brownish black streaks, exhibiting a slight concentration towards the tip of the wing.

Var. 2.—Has, in addition, several large round spots on disc of fore wing.

Var. 3.—Has numerous black spots on fore wings (formerly known as *D. nigrosparsa*).

Var. 4.—Has two conspicuous curved lines on fore wing from costa to inner margin (formerly known as *Declana junctilinea*).

Var. 5.—Has these two lines joined by two others running parallel to inner margin and costa.

Var. 6.—Has curved lines and black spots (*nigrosparsa* and *junctilinea*).

Var. 7.—Has fore wings suffused with dark greyish black, except two broad bands of the original light colour extending from costa to inner margin; hind wings also darker than usual.

Var. 8.—Has a broad dark central band on fore wing.

The moths which resulted from the above-described larvæ only belonged to three of the varieties. The following table, showing the dates of emergence, sex, and variation of the insects from each lot of larvæ, may perhaps be of some scientific interest.

Results of a batch of ova deposited by a female *Declana floccosa* of var. 1, and divided into two equal lots:—

CAGE 1.		CAGE 2.	
Fed on <i>Aristotelia racemosa</i> .		Fed on <i>Leptospermum ericoides</i> .	
12 males and 16 females of these—		15 males and 9 females of these—	
1 male belonged to	var. 2	2 females belonged to	var. 4
1 female „	„ 4	6 males „	„ 8
11 males „	„ 8	5 females „	„ 8
5 females „	„ 8	9 males „	„ 1
10 females „	„ 1	2 females „	„ 1
Date of first emergence, Dec. 10		Date of first emergence, Dec. 18	
„ last „	„ 25	„ last „	Jan. 3, 1890

From this table it will be seen that there was a much greater mortality among the larvæ fed on *Leptospermum* than those on *Aristotelia*, and also that the proportion of males was much greater in the former group, but the variation does not appear to have been materially effected. A large number of both sexes belonged to var. 1, and evidently inherited the characters of the female parent; while from the great preponderance of var. 8 over the others, I think we may fairly assume that the male parent belonged to that form. Of course I am aware that such experiments as these should be carried out on a much larger scale to give really reliable results, and also extend over several generations; but this I have not at present the opportunity to do. In the meantime I offer the above in order to awake more interest in such observations, which are, I think, much needed at the present time, when the laws governing the formation of species and varieties are attracting so much attention among entomologists.

Wellington, New Zealand, May 30, 1890.

COLEOPTERA COLLECTED BY MR. PRATT ON THE UPPER YANG-TSZE, AND ON THE BORDERS OF TIBET.

By H. W. BATES, F.R.S., F.L.S.

(Concluded from p. 213).

Family MELOLONTHIDÆ.

MELOLONTHA CUPRESCENS, *Blanchard*, Comptes Rendu, Acad. Sci., vol. lxxii. (1871), p. 811.

This metallic species of *Melolontha* was originally taken in Moupin by the French missionaries. Mr. Pratt's example agrees well as to colour and sculpture with Blanchard's short description. It is a male, Blanchard's being apparently a female. The antennal club (of black colour) is greatly elongated, three times the length of the remaining (1—3) joints, approaching in this respect the genus *Polyphylla*, and the pygidium is prolonged at the apex nearly as in *M. vulgaris* ♂. The elytral costæ (five on each side, including the sutural, the 4th much abbreviated anteriorly); two subparallel wheals on the disk of the thorax, the occiput and the legs are shining dark coppery; the rest of the dark brassy brown integument is clothed with very dense tawny-brown tomentum.

EUCHEIRUS PARRYI, *Gray*.

Chia-ting Fu. A single female specimen, agreeing with others with which I have compared it from Darjeeling, except in the much fewer reddish spots of the elytra. A rather large basal and a subhumeral spot are seen in nearly the same position, and there is a fine line running parallel to the suture, as in most examples of *E. parryi*; but there is also a broadish submarginal vitta extending from before the middle nearly to the apex, which I do not see in the examples examined of the Himalayan species.

Family RUTELIDÆ.

ANOMALA (EUCHLORA) TRUNCATA, n. sp.

Resembles *A. viridis* (Fab.), and *A. martini* (Hope), but the under-side golden green (not coppery), with the legs, especially the tibiæ and tarsi, ruddy golden. The upper surface differs also in being apple-green, with but slight gloss, owing to the denser and rather stronger punctuation, which in places coalesces and forms short transverse wrinkles. The scutellum, sides of the head and thorax, and marginal rims of the elytra, are metallic, light golden green. The elytra show faint traces of punctured striæ, one sutural and two pairs on the disk, but they are not strongly impressed as in *A. martini*. A distinguishing character of the species is the strong oblique truncature of the apices of the elytra, the lateral margins of which, distinctly flattened out to the apical curvature, abruptly cease (without forming an angle), the rest of the apical margin being straight and immarginate to the subobtuse sutural angle. The pygidium is closely granulate-strigulose. The under-side of the body is smooth in the middle, and densely punctulate and tawny pubescent on the sides of the sterna and hind coxæ, arcuate-punctate (and thinly pubescent) on the sides of the ventral segments. Long. 21—25 millim. ♂, ♀.

Chia-ting Fu.

MIMELA POMACEA, n. sp.

Of oblong form (at least in the female, the only sex known); elytra relatively elongate. Above dark apple-green, without metallic lustre; the clypeus and lateral border of the thorax yellow. Rather strongly punctured, more finely and sparsely on the crown and thorax, which are hence more glossy than the clypeus and elytra; on the latter the punctures lie very close, without coalescing, and are arranged in numerous rows on the disk and sides. The antennæ, legs, and under-side are reddish, with a coppery tinge; the femora paler; the tarsi nearly black, and the sides of the abdomen very dark metallic green. The breast is clothed with longish tawny hairs; the abdomen and legs more scantily hairy; the pygidium is closely and finely confluent-punctate, subopaque, and hairy on its borders. The mesosternum has an acute process, reaching a little further than the coxæ. Long. 20 millim. ♀.

Wa-shan.

Family CETONIIDÆ.

NEOPHÆDIMUS AUZOUXI, Lucas, Ann. Soc. Ent. Fr. 1869; 1872 p. 280, pl. 14, f. 1—3, ♂, ♀.

Wa-shan, 6000 feet. Previously found by Père David at Moupin; on leaves of Indian corn, in August, according to Lucas.

RHOMBORHINA JAPONICA, Hope.

Wa-shan and Chia-ting Fu. Differs in no respect that I can discover from Japanese examples.

CETONIA MARMORATA, Fabr.

Var. *cathaica*.

Belongs to the series of species and local varieties closely allied to the European *C. marmorata*, in which the clypeus is nearly straightly truncated in front, the pygidium slightly and evenly convex in both sexes, and the abdomen in the male longitudinally grooved and depressed. The colour above and beneath, including the legs, is dark green, with strong brassy or golden reflections, and with the usual short depressed transverse lines and spots on the elytra clothed with chalky tomentum. The head and thorax are generally spotless, but the latter in some examples has four small white spots arranged in a wide quadrangle, and other white streaks in the marginal grooves. The form is always relatively broader than in either *C. marmorata* or *C. submarmorea*, and the surface more polished. The sides of the clypeus are not sharply elevated, the front margin is acutely reflexed and without sinuation, and the forehead is broadly convex down the middle and only sparsely punctured. The thorax is rather sparsely punctured, and on the sides only, the præscutellar sinuation strongly marked. The elytra are strigulate on the sides and near the shoulders, and in the usual postmedian depression, elsewhere smooth. The pygidium is very slightly convex in the middle in both sexes, and loosely transversely strigulose. The hind tarsi are robust, in the male as long as the tibiæ, in the female shorter. The femora and tibiæ are strigulose, like the pygidium; the hair fringe of the femora and inner side of hind tibiæ is orange-tawny. The mesosternal process is broad and arcuated in front as in *C. marmorata*. The sides of the metasternum are strigose and spotted with chalky tomentum, and the abdomen has two rows of transverse tomentose spots on each side, which are smaller in the female than in the male, and sometimes wanting. Long. 21—25 millim. ♂, ♀.

Wa-shan and Chia-ting Fu. Many examples.

This species is probably sometimes mistaken for *C. confuciana*, Thomson, which it resembles in colour and sculpture. But the description of that species clearly refers to another Chinese form in which the apex of the clypeus is reflexed and bifid. At least this is the only way in which we can interpret the phrase "Caput antice bituberculatum," as applied to a *Cetonia*. The *C. confuciana*, Thoms., will therefore be a local form of *C. submarmorea*, or a species closely allied to it, which belongs to a distinct group distinguished by the gibbous apex of the pygidium in the male. Among the more northerly species or races *C. marmorata* var. *cathaica* comes nearest to *C. insperata*, Lewis, differing from it chiefly in colour and size, and especially in its much broader form.

CETONIA SUBMARMOREA, *Burmeister*.

Chia-ting Fu.

A dark brassy green, and less closely punctured variety, resembling therefore the above-described *C. cathaica*; but the bifid clypeus and the gibbous pygidium and scarcely depressed abdomen of the male leave us in no doubt that it belongs to the *C. submarmorea* group.

CETONIA VIRIDI-OPACA, *Motschulsky*.

Chia-ting Fu. A single example, agreeing in form and colour with examples of *Motschulsky's* species from the Amur, but differing somewhat in sculpture. *C. viridi-opaca* is known to belong to a very variable series of the genus, the specific limits of which have been subject to much discussion.

Family LAMIIDÆ.

LAMIOMIMUS GOTTSCHER, *Kolbe*, Archiv. für Naturgesch. 1886,
p. 224, tab. xi. fig. 39.

Two examples from Ichang, differing in nothing, except the darker (brassy blackish brown) ground colour, from those found in Korea and the neighbourhood of Peking.

CYRIOCRATES HORSFIELDII, *Hope*.

Ichang. One small example.

MELANAUSTER CHINENSIS, *Forster*.

Chia-ting Fu.

COSCINESTHES, nov. gen.

A Monohammid form, with a sharp and complete margin to the cicatrice of the scape, rather narrowly divaricated tarsal claws, and simple outer edge to the intermediate tibiæ. These characters bring it into near relationship with *Eutaniopsis* (Gahan), but the facies and other structural features are very different. The head is rather narrow, the front parallel-sided, but the antenniferous tubercles contiguous at the base and separated above by a narrow cleft; the lower lobe of the eyes narrow, and barely reaching halfway to the base of the mandibles. The antennæ (♀?) are a little longer

than the body, very scantily fringed at the base; the scape rather short, obconical; the 3rd and 4th joints equal, each about one-third longer than the scape, 5th a little shorter, 6th to 11th decreasing in length and thickness. The thorax is cylindrical, much narrower than the elytra, constricted near the base, but not narrower behind than in front, as in *Eutaniopsis*; the lateral spines sharp, their basal dilatation very slight. Elytra moderately elongate, somewhat flattened above, rounded at the apex; shoulders rectangular. The anterior haunch-sockets are rather widely open behind. The tarsal claws small and weak; they are not so nearly parallel as in *Eutaniopsis trifasciella*, but at the same time they are not strictly divaricated.

COSCINESTHES POROSA.

Black, thinly clothed with coarse adpressed, reddish brown pile; antennal joints 3rd to 11th grey at the base, the length of the grey ring increasing towards the apex. Head rather strongly punctured; thorax coarsely granular; elytra granulated close to the base and on the shoulders, the rest of the surface cribbled with mostly large, rounded and contiguous punctures or foveæ; the elevated parts of the surface are black and shining, and the under surface is minutely spotted with black. Long. 21 millim.

Wa-shan, alt. 6000 feet. One example.

BATOCERA LINEOLATA, Chevrolat.

Chia-ting Fu. Described by Chevrolat from examples received from Shanghai. The species is found also in Japan and in Formosa, and is subject to considerable variation both in form and markings.

BATOCERA DAVIDIS, Deyrolle, Ann. Soc. Ent. Fr. 1878, p. 131.

Chia-ting Fu. One example referred with some hesitation to this species.

APRIONA RUGICOLLIS, Chevrolat.

Like *Batocera lineolata*, recorded originally from Shanghai and subsequently proved to be not uncommon in Japan. Occurs also at Amoy and other places in Eastern China.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS

BY F. H. PERRY COSTE, F.C.S.

IV.—RESULTS (*continued*).

EXPLANATION OF THE TABLES.*

"O" signifies that the colour was unaffected. A single or double bracket enclosing the cipher, thus (O) ((O)), slightly qualifies it; such must be read as "practically unaffected," &c.

A dash ——— signifies that no experiment was made in such cases.

"Gone," is given as the result in some cases; these were cases in which no definite colour *change* could be noted, but the original colour had certainly disappeared. *Hepialus humuli* may be taken as a strikingly unsatisfactory instance in point.

* There are included in these tables several species not really British (see footnote, p. 222); but these are either occasional visitors or closely allied to native species, which I was unable to obtain.

COLOUR =
YELLOW
AND ORANGE

REAGENT	<i>Papilio machaon</i>	<i>Vanessa antiopa</i>	<i>Euchloë cardamines</i>	<i>Colias edusa</i>	<i>Gonopteryx rhamni</i> , ♂	<i>Lycæna alexis</i>
Hydrochl. acid, strong	White	Faded to whitish	Faded to white	Quite white	Whitened	((O))
Nitric acid, 50 per c.	White	O	White	White	Good deal gone*	Left, but very faded.
Sulphuric acid	White	Whitish	White, & faded yellow	White	Gone, whitish	O
Acetic acid, strong	Whiter	Whitish, semitransp.	O	O	(O)?	O
Potas. hydrate, 25 p.c.	White	Whiter, semitransp.	White (vid yellow).	Quite white	Nearly all gone	Gone (whitish)
Ammonia, strong	White, partly transp.	Whiter	Quite white	Quite white	Whitened	Paler, half-faded
Sodic hydrate, 10 p.c.	White, little transp.	—	White	Quite white	Less yellow, whiter	Gone (whitish)
Number of other re- agents tried, and general result	The yellow at tips less susceptible than rest	A very unsatisfac- tory colour indeed	Three	Three	{ Similar or negative re- sults with thirteen other reagents; an unsatisfactory colour }	Results of 12 other reagents, = O. By phenol, very faded
<i>Calli. hera lutescens</i>		<i>Arctia villica</i>	<i>Hepiabus humuli</i> , ♀	<i>Rumia crataegata</i>	<i>Venilia maculata</i>	<i>Camptogram. bilineata</i>
Hydrochl. acid, strong	O	O	{ A sickly yellowish, nearly transparent }	O, or little whitened	O	Faded to nearly white
Nitric acid, 50 per c.	O	O	{ } Towards tr. yellowish (O)	Fairly whitened	(O)	Faded whitish
Sulphuric acid	O	O, trifle transparent	{ } Towards tr. yellowish (O)	Dull light brownish	Trifle duller brownish	Trifle reddishened
Acetic acid, strong	O	(O), partly transparent	{ } Towards tr. yellowish (O)	Somewhat whitened	O	O
Potas. hydrate, 25 p.c.	O	Less brilliant only	{ } Towards tr. yellowish (O)	Semitranspnt. white	Dull brown-yellow	Whitish
Ammonia, strong	O	(O), less brilliant	{ } Towards tr. yellowish (O)	White	Very pale faded yellow	Almost whitish
Sodic hydrate, 10 p.c.	O	O, some transparent	{ } Towards tr. yellowish (O)	Fairly white	White	Dull and faded
Number of other re- agents tried, and general result	.....	.....	Six; much the same	{ Ten; similar, } or less so	Nine; chiefly = O..	
<i>Angerona prunaria</i>		<i>Hyria auroraria</i>	<i>Abraxas grossulariata</i>	<i>Xanthia silago</i>	<i>Triphena pronuba</i>	<i>Helicia tenebrata</i>
Hydrochl. acid, strong	O	Some whitish, some O	Fading somewhat	(O)	O	O
Nitric acid, 50 per c.	Dull brown-yellow	Whitish	Almost white	O	O	—
Sulphuric acid	Dull brown-yellow	Dull white instantly	Yellow-white	O	O	—
Acetic acid, strong	O	.....	O	O	O	—
Potas. hydrate, 25 p.c.	Dull brown-yellow	O	Gone; white	Only duller	Very faded towards whitish	O
Ammonia, strong	Less deep and bright	O	Fading towards white	O	O	—
Sodic hydrate, 10 p.c.	Whitish yellow, very [faded]	Dull yellowish whitish	Almost white	Dull and little faded	O	—
Number of other re- agents tried, and general result	.....	.....	{ Nine or ten; } results, = O	.....	Nine; results, = O	

* *G. rhamni*, by nitric acid in another experiment gave white to slight brownish.

COLOUR =
RED
(AND PINK)

REAGENT

Hydrochl. acid, strong
Nitric acid, 50 per c.
Sulphuric acid
Acetic acid, strong
Potas. hydrate, 25 p.c.
Ammonia, strong
Sodic hydrate, 10 p.c.
Number, and effect,
of other reagents)

Vanessa atalanta

BECAME

Dull "cardui" brown
Fawn or yellow-brown
"cardui" brown...
O
Faded "cardui" brn.
Rather faded ditto
Yellow-brown
Ten; chiefly = O ..

Arctia caia

BECAME

Orange at once
Orange to yellow
Orange at once
O*
Transpt. orangeish..
Only less brilliant*
Only dull flesh
Eight or nine; some
orange, &c., some O)

Hygia auroraria

BECAME

Yellow instantly, then
Ditto [whitish
Dull white instantly
(O)
Dull yellowish
O
Dull yellowish whitish

Van. cardui (below)

BECAME

Faded to whitish ..
Ditto
Some ditto
Faded to whitish
Ditto
.....

Euchelcia jacobææ

BECAME

Orange-yellow at once
Lem.-yel. (deepening)
Almost O .. [at once
O
Very faded, no yellow
Very faded indeed, red
Only faded red
Nine; chiefly O, or
slight

Acidalia rubricata

BECAME

Peculiar dunnish in-
Ditto [stantly
Ditto
Brownish [stantly
Peculiar dunnish in-
Brown-dunnish
Peculiar dunnish in-
[stantly

Parnassius apollo

BECAME

Orange
Pale orangeish
Reddish orange
O
Red-orange (by NaHO
(O) [25 per cent.)
.....

Hepialus humuli, ♀

BECAME

Gone { Leaving
Gone { faint orange
Gone { marking
((O))
Faint orangeish
O
Six; similar; a
most unsatis-
factory colour

Papilio machaon

BECAME

Little browner only
.....
.....
Brown
.....
(Not a true red at
} at all, evidently }

Catocala nupta

BECAME

Orange-yellow at once
Ditto
Orange-yel. (not all)
Slightly orange.
Faded red-orange
Orange (not all)
Faded flesh
Eight; chiefly orange
or so

Smerinthus ocellatus

BECAME

Yellowish (at once)..
Yellowish to white..
Brownish yellow...
O
Yellowish brn. at once
Pinkish br., very pecu-
Brownish yel. [lar col.
.....

Xanthia silago

BECAME

Yellow at once
Ditto
(Brownish) & fainter
Browner
Duller and browner
Only duller
Dull, and little faded

Zygæna filipendule

BECAME

Bright orange
Yellow to orange
Brown-orange
O
Partly gone; trans-
O [parentish
Faded reddish
(Twelve; nearly all
} = orange

Deiopeia bella

BECAME

Dull fleshish yellowish +
Brightish yellow at once
Yellow
O (trifle faded)
Some left; some gone
(O)
(O)

Deilephila lineata

BECAME

Faded yellowish whitish
Ditto
.....
.....
.....
.....
.....
.....

* * These two experiments were made on *C. hera* : not on *A. caia*.

+ This was final result.

Wing went yellow instantly on adding the acid : then changed to above.

COLOUR = } IN CHESTNUT }		Vanessa io (unique)		V. antiopa (unique)		V. cardui		V. urticae		Argynnis pophia		Melitaea athalia	
REAGENT		BECAME		BECAME		BECAME		BECAME		BECAME		BECAME	
Hydrochl. acid, strong	..	Gone; blackish	..	Dissolved out; blackish	..	Only slightly faded	..	Whitish	..	Faded; dirty whitish	..	O	..
Nitric acid, 50 per c.	..	Gone; lightish	*	Ditto; but less	[ish]	Little faded	..	Whitish } dissolved	..	O	..	Yellowed; = little	..
Sulphuric acid	..	Gone; blackish	..	.....	..	Chiefly dissolved out	..	Dissolved out	.....	(O)	..	(O)	[fading]
Acetic acid, strong	..	(O)	..	.....	..	O	..	Partly gone; faded	..	((O))	..	O	..
Potas. hydrate, 25 p. c.	..	Quite dissolved out	..	Gone; black	..	Faded whitey-brown	..	Quite gone; brownish	..	Faded to whitish	..	Much faded; yellow-	..
Ammonia, strong	..	Mostly ditto (left blk.)	..	.....	..	Chiefly gone; whitish	..	Quite gone [white	..	Faded to whitish	..	(O)	[ish]
Sodic hydrate, 10 p. c.	..	Ditto (left black)	..	.....	..	Quite faded; whitish	..	Quite gone; white	..	Very faded brown	..	Much faded; yellow-	..
Number, and effect, } of other reagents }		Twelve; some O, } some same .... }		.....		{ Fifteen; similar, and O		Fourteen; similar, more or less, By silver nitrate, darker		Fifteen; similar, but weaker; and O. By boric acid, very faded			
		<i>Epinephile tithonus</i>		<i>E. janira</i>		<i>Satyrus megæra</i>				<i>Ctenonym. pamphila</i>		<i>Polyommatus phlaeas</i>	
		BECAME		BECAME		BECAME		BECAME		BECAME		BECAME	
Hydrochl. acid, strong	..	Partly faded	..	Altered and faded	..	Only little faded	..	Whitish	..	Dirty brownish white	..	Chiefly faded	..
Nitric acid, 50 per c.	..	Trifle faded	..	Very faded indeed	..	Partly faded	..	Whitish } dissolved	..	Dirty whitish	..	Some gone	..
Sulphuric acid	..	Little faded +	..	Altered and faded	..	Trifle reddened	..	Dissolved out	.....	Faded	..	Faded; much gone	..
Acetic acid, strong	..	Little faded ?	..	.....	..	O	..	.....	..	Peculiar; faded ?	..	Almost O	..
Potas. hydrate, 25 p. c.	..	Faded; brownish white	..	(A colourless grey- ish; no doubt, dissolved	..	Faded moderately	..	.....	..	Quite white	..	Whitish; entirely	..
Ammonia, strong	..	Little faded	..	.....	..	Not much faded	..	.....	..	Very faint yellowish	..	Ditto ditto	[faded]
Sodic hydrate, 10 p. c.	..	Faded-brown	..	.....	..	Not much faded	..	.....	..	Quite white	..	Ditto ditto	..
Number, and effect, } of other reagents }		Fourteen; similar, and O. By phenol, much faded		.....		{ Fourteen; chiefly O. By phenol, faded yellowish white		.....		{ Fourteen; chiefly "fading" }		Fifteen; some simi- lar; some = O	
		<i>P. virgaurea</i>		<i>Hesperia sylvanus</i>		<i>Limenitis sibylla</i> (below)		<i>Danaus chrysippus</i>		<i>Argynnis selene</i>			
		BECAME		BECAME		BECAME		BECAME		BECAME			
Hydrochl. acid, strong	..	Much dissolved out	†	.....	..	Darkish grey-dun	..	(Dissolved out	.....	Chiefly dissolved;	..	faded brownish white	..
Nitric acid, 50 per c.	..	More so; faded brnsh	..	Faded	..	Much dulled	..	to very	.....	Faded; partly dissd.	..		..
Sulphuric acid	..	Partially dissolved out	..	.....	..	Dark dun	..	considerable	.....	Same as first	..		..
Acetic acid, strong	..	Only little affected	..	Somewhat faded	..	Towards dun	..	extent	.....	Somewhat faded	..		..
Potas. hydrate, 25 p. c.	..	Whitish; completely	§	Dissolved; white	..	.....	..	Entirely dissolved;	..	Dissd.; almost white	..		..
Ammonia, strong	..	(Whitish; practically	..	Ditto; almost white	..	.....	..	whitish grey, i. e.,	..	Much dissolved; faded	..	yellow-brown	..
Sodic hydrate, 10 p. c.	..	(completely dissd.)	..	Dissolved; white	..	{ Grey-dun	..	membrane colour)	..	Dissd.; almost white	..		..

* The pigment distinctly extracted.

† In another experiment, a trifle reddened.

‡ A violet streak on costa.

§ A violet streak on costa.

DESCRIPTIONS OF TWO NEW SPECIES OF PHYTOPHAGOUS COLEOPTERA FROM THE EAST.

BY MARTIN JACOBY, F.E.S.

CHRYSOMELA BELLA, n. sp.

More or less elongate, metallic cupreous, varied with blue or green; thorax deeply punctured near the lateral margin, the latter scarcely thickened, the basal margin, a narrow middle line and lateral spot, blue; elytra finely punctured, the suture and a band at the sides, violaceous blue. Length, $2\frac{1}{2}$ —4 lines.

Of rather elongate shape and resembling *Orina speciosissima*, but without the deep lateral thoracic depression of that species; the head sparingly and very finely punctured, with a central narrow groove, cupreous or metallic greenish, the base with a larger or smaller violaceous spot; palpi nearly black, the third and fourth joints equal, the last one truncate; antennæ extending a little beyond the base of the elytra, metallic dark violaceous, the lower six or seven joints shining, the rest opaque, pubescent, the third joint elongate, the others short, nearly equal, the terminal joints gradually thickened; thorax transverse, rather more than twice as broad as long, the sides nearly straight or very little rounded, the anterior margins straight at the middle, produced into a blunt point at the angles, the sides but slightly thickened with some irregularly distributed deep punctures, the rest of the surface finely (sometimes scarcely perceptibly) and closely punctured, metallic cupreous, a large spot at each side near the basal margin, the latter itself and a narrow central line, metallic violaceous; scutellum bluish; elytra finely punctured, the punctures arranged in rather close and irregular rows, which become indistinct towards the apex; the sutural margin narrowly and a broad sublateral stripe from the base to the apex, violaceous, the intermediate spaces, reddish cupreous; under side metallic green or blue, the breast and the margins of the abdominal segments, as well as the femora, more or less cupreous; the first joint of the anterior tarsi longer than the second one, all closely pubescent below; the male organ strongly curved, shallowly hollowed, the apex deeply excavated, the extremity slightly truncate.

Hab. Ichang, China (Pratt).

According to Mr. J. Weise, this species, of which many specimens were obtained, is the representative of a new genus, allied to *Melasoma*; in my opinion, however, the differences in the structural characters in the present insect are not sufficient to justify a separation from *Chrysomela*, the numerous species of which differ frequently to a similar degree.

SEPHARIA, Fairm.

I refer to this genus of Galerucidæ, described by Fairmaire in the 'French Annals,' 1889, an insect from Kaschmir, which seems to possess all the structural characters, as pointed out by M. Fairmaire. This author has, however, not mentioned the shape of the thorax, nor the length of the tarsi. I, therefore, add here that the thorax in the present species is transverse, more than twice as broad as long, and its disc obsoletely transversely depressed; the tibiæ are all armed with a distinct spine, and the first joint of the posterior tarsi is nearly half the length of the

tibia; the anterior coxal cavities are closed. *Sepharia*, on account of the long metatarsus of the posterior legs, seems allied to *Luperodes* and *Ochræa*; the shape of the thorax separates the genus from either; the closed cavities, from *Luperodes*; the broad, concave, and entire elytral epipleuræ distinguish *Sepharia* from *Monolepta*.

SEPHARIA FRONTALIS, n. sp.

Oblong-ovate, testaceous; the scutellum, a spot at the basal margin of the elytra, their extreme apex, the breast and sides of the abdominal segments, and a spot at the apex of the pygidium, black; thorax impunctate; elytra scarcely perceptibly punctured.

Mas.—Head with a deep excavation and a triangular black projection, the clypeus with two smaller depressions; the last abdominal segment trifold, the middle lobe slightly longitudinally concave. Length, 3 lines.

Of a pale testaceous colour, the head broader than long, the eyes prominent and large, the space between them excavated, the upper margin of the excavation fringed with hairs, the interior furnished with a triangular projecting black point; antennæ testaceous, two-thirds the length of the body, the first joint very elongate, curved and thickened towards the apex, the two following joints small, the fourth as long as the first, the following joints smaller, furnished with some stiff hairs; thorax narrowly transverse, the sides narrowly margined, slightly rounded and narrowed towards the base, the anterior margin straight, the angles not prominent, the surface obsoletely transversely depressed, not visibly punctured; scutellum triangular, black; elytra convex, but little widened posteriorly, the apex rather truncate, their epipleuræ broad, concave, continued to the apex, the surface extremely minutely punctured, testaceous, a narrow streak or spot (sometimes absent) is placed on the extreme basal margin near the shoulders, and another small spot at the extreme sutural apex; the breast, the sides of the abdominal segments, to a greater or smaller extent, and a spot at the apex of the pygidium, as well as one at the flanks of the thorax, black; legs long and slender, testaceous, the tibial spines black.

In the female the head is only obsoletely depressed between the eyes, and simple, as well as the last abdominal segment.

Several specimens obtained by Mr. Leech in Kaschmir.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

OCCURRENCE OF *PLUSIA MONETA* IN BRITAIN.—Mr. W. M. Christy informs me that he has lately taken a specimen of *Plusia moneta*, Fabr., in his moth-trap. The insect is now on the setting-board, but the fortunate captor has kindly promised to lend me the specimen to figure in the September number of 'The Entomologist.'—R. S.

A DAY AT TILGATE FOREST.—On Whit-Monday, May 26th, the South London Entomological and Natural History Society held their first field-day at Tilgate. Meeting at Three Bridges station, the line of route selected was almost parallel to the London and Brighton railway, passing through the Tile yard, Cinder Valley, on to Balcombe tunnel. This is, perhaps, the best collecting-ground of the district, being well wooded with oak, ash, beech, larch- and spruce-firs, alder, and birches, the lovely growth and foliage of the latter being at their best, and worth the journey

to see : you have miles and miles of birch, with an undergrowth of heather and fern, and here and there boggy splashes, all splendid collecting-ground, and producing many good and rare species. The spruce-firs produce *Eupithecia togata*, the larvæ being found feeding in the cones in the autumn ; the birches yield *Notodonta carmelita*, *Endromis versicolor*, *Cerura bicuspis*, *Notodonta dictæoides*, &c. ; the beech, *Stauropus fagi* ; the alder, *Sesia sphegiformis*, &c. To name all the good species that may be taken here by diligent working would indeed make a long list. Those of our party that arrived by the earlier morning train found Lepidoptera flying freely. *Pieris brassicæ*, *P. napi*, and *P. rapæ* all fairly common ; *Anthocharis cardamines* were very numerous ; hibernated Vanessidæ and tattered *Gonopteryx rhamni* scuttled hurriedly along ; *Argynnis euphrosyne* in numbers ; whilst a few *Syrichthus malvæ*, *Nisoniades tages*, and *Hesperia sylvanus* flitted about in the bright sunshine. The beating-stick applied to the alders dislodged a few *Hypsipetes impluviata* and *Eupisteria oblitterata* (*heparata*), with several commoner Geometridæ ; whilst by a closer search at the alder stems, a few larvæ of *Sesia sphegiformis* were found feeding (it feeds for three years), but only two spun- and fed-up specimens were met with ; evidently the species is by no means common. The two pupæ found produced two fine males on June 6th, and were the best captures of the day. *Venilia macularia* and *Fidonia atomaria* were in profusion, and a few pretty forms of either could be selected. *Zonosoma pendularia* and *Tephrosia punctulata* were fairly common on the tree stems, although less numerous than most years. The blue-bells and ferns in the Cinder Valley looked most charming, many white varieties of the former (*Scilla nutans* var. *alba*) occurred ; and by the side of the little stream, *Athyrium filix-fœmina* and *Lastrea æmula* (the hay-scented fern) grew in great luxuriance ; and the variable *L. dilutata* was much in evidence. *Lomaria spicant* adorned every wet rill, and on the dryer ground, *Lastrea oreopteris* looked beautiful in its shuttlecock tuft, and profuse abundance. The delicate little ivy-leaved bell-flower, *Campanula hederacea*, in places carpeted the ground, although not quite in flower ; and in one spot masses of the stag's-horn moss, *Lycopodium clavatum*, grew amongst the *Sphagnum* and heather. By four o'clock our party (fourteen) found that the inner-man required recuperating, so tracks were made for the 'Norfolk Arms.' An *alfresco* wash from the cool water of the old well and a light tea refreshed us all for our return through the forest. Unfortunately, as the sun went down the cold north-east wind quite stopped any evening flight, so that our captures were not much augmented,—a few Tortrices, Eupitheciæ, and Eudoriæ ; but nothing of much consequence. Our attention was diverted to the twisted-up leaves for larvæ. *Asphalia fluvicornis*, *Cheimatobia boreata* and *Phycis betula* were fairly common on the birch, although much less so than some years ; and a few *Tethea reclusa* larvæ were found neatly spun-up in the top shoots of willows. Although during our ramble we had made no specially rare captures, the day was thoroughly enjoyed by all.—W. H. TUGWELL ; June 23, 1890.

JUNE OUTING OF THE S. LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—On the 21st of June about twenty members of this Society and their friends went by train to Leatherhead, where they were met by Mr. C. A. Briggs and his brother Mr. T. H. Briggs. The former gentleman kindly conducted the party to Mickleham. After a sharp walk through the town, and a pleasant jog-trot along the lanes and over the Downs, a convenient halting-place was reached about 4.45 p.m. Here the party

was broken up, the members wandering away singly, or in twos and threes, to collect what they would or could for the space of one hour by the clock. All appeared to have made good use of their sixty minutes; and if some had not made many captures, they had at least travelled far, as it was something beyond the appointed time ere the last straggler had reached the rendezvous. Mr. Billups was busy among the Diptera, &c. (see list below), and the Lepidopterists had some sport with *Setina irrorella*, *Acidalia ornata*, and the usual *pot-pourri* of the "hilly field" at this season of the year, comprising various Pterophoridae, Crambidae, and Tortrices. The members being again assembled Mr. Briggs resumed command, and marched them back to Leatherhead, where he most hospitably entertained the whole party at his house.

At the meeting of the above Society held on the 26th of last month Mr. Billups exhibited types of the insects taken at Mickleham by himself; and although, as previously stated, the actual working time was limited to some sixty minutes, still Mr. Billups managed to get a considerable number of insects of many Orders together; and to show what may be accomplished with a little energy, in a comparatively short time, it may not be uninteresting to enumerate some of the captures. Diptera was the most largely represented Order, there being twenty-nine species, consisting of the following:—*Scatopse notata*, L.; *Dilophus febrilis*, L.; *Bibio marci*, L., and *johannis*, L.; *Simulium reptans*, L.; one species of *Chironomus*, not determined; *Pachyrrhina crocata*, L.; *Tipula oleracea*, L.; *Pachygaster leachii*, Curt.; *Nemotelus nigrinus*, Flin.; *Beris clavipes*, L., and *chalybeata*, Foerst.; *Hæmatopota pluvialis*, L.; *Chrysops cæcutiens*, L.; *Leptis scolopacea*, L.; *Leptogaster cylindricus*, Deg.; *Dioctria rufipes*, Deg., and *baumhaueri*, Mg.; *Dysmachius trigonus*, Mg.; *Rhamphomyia sulcata*, Flin.; *Empis tessellata*, F., and *livida*, L.; *Dolichopus æneus*, Deg.; *Leucozona lucorum*, L.; *Conops vitellinus*, Lw.; *Tetanocera punctulata*, Scop.; *Platystoma seminationis*, F.; *Acidia heraclei*, L.; and *Spilographa zoë*, Mg. Hymenoptera, twenty-three species, among which were types of the following sub-families:—Three species of Diploptera, namely *Odynerus parietum*, L.; *Prosopis communis*, Nyl.; and *Nomada alternata*, Kirby: the Ichneumonidae having ten representatives, i. e. *Chasmodes motatorius*, Fab.; *Ichneumon vaginatorius*, Lin., *I. luctatorius*, L., and *I. latrator*, Fab.; *Colpognathus celerator*, Gr.; *Dicalotus pumilus*, Gr.; *Phæogenes planifrons*, Gr., and *fulvitaris*, Gr.; *Hemiteles bicolorinus*, Gr.; and *Pezomachus distinctus*, Föerst.: while *Proctotrypes ater*, Hal., *Codrus apterogynus*, Hal., *Lagnodes pallidus*, Föerst., and *Chelogynus lapponicus*, Hal., filled a gap in the Oxyuradæ: *Callimome regius*, Ns., and *Syntonaspis caudata*, Ns., were the only species of Chalcididae obtained; while *Rhodites rosæ*, L., and *R. eglanteriæ*, Hartig, represented the gall-makers, or Cynipidae. Two species of sawfly, or Tenthredinidae:—*Lophorus pini*, L., and *Hylotoma cyanea-crocea*, Cam., bringing up the balance of Hymenoptera. Only five species of Coleoptera were taken, these being—*Scaphisoma agaricinum*, Ol.; *Cistela murina*, L.; *Ædemera lurida*, Marsh.; *Magdalinus aterrima*, L.; and *Clytus arietis*, L. Hemiptera had three representatives, in *Pantilus tunicatus*, Fab.; the not common *Stiphrosoma leucocephalum*, L.; *Plagiognathus arbustorum*, Fab. *Philanus exclamationis*, Thunb., being the only species of Homoptera; one solitary species also represented the Neuroptera, *Stenopsocus cruciatus*, L. In all 104 insects were captured by Mr. Billups, representing 10 families; in addition to which there were

three species of Arachnida—*Marpera nervosa*, Clerck ; *Dysdera cambridgii*, Thor. ; and *Nemastoma bimaculata*, Meig.

A DAY IN HERTFORDSHIRE.—The Metropolitan Railway extension to Chesham affords a convenient means of reaching some very excellent collecting-ground in Hertfordshire and Buckinghamshire. Since this line has been opened I have explored the country around the two stations between Rickmansworth and Chesham. Although, so far, I have not been able to properly investigate its entomological fauna, I am satisfied that the whole district is one which would well repay careful work, and, considered from a collector's point of view, may be regarded as a land of promise. The following notes refer to the Rickmansworth section :—During an autumn stroll in the direction of Harefield, I last year took a good number of the larvæ of *Eupithecia albipunctata* from off flowers and seeds of *Angelica sylvestris*. On the 28th of May, of this year, I made the same journey, accompanied by Mr. R. W. Thompson. We commenced work by searching for ova of *Euchloë cardamines*, and by close and careful examination of the flowers of *Cardamine pratensis*, and another member of the Cruciferae of whose name I am unfortunately ignorant, we found the little orange eggs singly here and there. By the time we had tired ourselves with this back-aching amusement we had obtained a fair number of ova. We next tried our luck at beating the herbage for larvæ, but the only species obtained in any quantity was *Cidaria dotata* (= *pyraliata*) from *Galium*. The larva of *Plusia chrysitis* being a desideratum, we paid particular attention to likely-looking patches of nettles, but only obtained four *chrysitis* and two *iota*,—a poor return, certainly, for the amount of energy put into the work ; so we determined to cease operations until we arrived on the heath across which the road we were following would pass, and where we hoped to find plenty of occupation. The first moth to engage our attention on reaching the heath was *Stigmonota internana* ; hundreds of these pretty little insects were flying about the furze bushes in company with *Catoptria ulicetana*. Farther on an occasional *Eupæcilia maculosana* was netted as we passed near some wild hyacinths. An attack was then made on the trees for larvæ, but the beating-stick failed to persuade anything better than *Phigalia pedaria*, *Oporabia dilutata*, and *Hybernia defoliaria* to drop into the umbrella. Searching rewarded us with larvæ of *Tethea subtusa* between leaves of white poplar ; *T. retusa*, on sallow ; *Phycis betulæ*, in a web at the ends of birch twigs ; and *Pædisca ophthalmicana*, on white poplar. After leaving the heath we noticed some yellow rattle (*Rhinanthus crista-galli*) in a grass meadow : as there was a convenient footpath through this field, we entered, and were pleased to find *Emmelesia albulata* just out, and in some abundance ; some pretty forms were secured. One or two examples of *Heliaca tenebrata* (= *arbuti*) were also observed. Altogether very few imagines came under our notice during the morning, but, in addition to those already mentioned, we saw *Venilia macularia*, *Panagra petraria*, and *Melanippe sociata*. Towards evening, when we returned to the heath, the last-named species appeared in considerable numbers, and, at the same time, odd specimens of *Emmelesia decolorata*, *E. affinitata*, and *Coremia unidentaria*, were captured, as also were single examples of *Argyrolepis hartmanniana* (= *baumanniana*) and *Catoptria albersana*. As the light waned we packed up our traps and turned towards Rickmansworth. At one time we were disposed to think that we had been unwise in not providing ourselves with lamps and sugar ; but after sunset there was a

sudden decrease in the temperature, and scarcely an insect to be seen on the wing, so we consoled ourselves with the philosophical reflection that we were not losing much by our omission.—RICHARD SOUTH.

A WEEK IN THE NEW FOREST.—Although the season is not as yet very far advanced, a few notes on the result of a week's collecting at Lyndhurst may perhaps be of interest to those readers of 'The Entomologist' who intend to work the New Forest later in the summer. I arrived at Lyndhurst on June 21st, and immediately called upon a well-known local entomologist of great experience. His report was not encouraging, and, unfortunately, was fully borne out by my subsequent experience. After a futile night's sugaring, and a day's rest on the Sunday, I began work in earnest on the 23rd. The weather was very hot, but the sky was thickly clouded over all day, and in consequence everything had to be beaten up. The only insects which put in an appearance were *Argynnis selene* on the heaths, and the ubiquitous *Epinephela ianira*, whose mission in life seems to be to "come out strong" under depressing circumstances. However, by hard work at beating, I managed to secure by one o'clock some fine *Metrocampa margaritaria*, *Boarmia repandata* (including some pretty varieties), *Bapta taminata*, *Pararge egeria*, *Eubolia plumbaria* (*palumbaria*), *Ephyra linearia* (*trilinearia*), and a beautiful pair of *Drepana falcata* (*falcula*), which were taken from birch. I afterwards worked the heath, and got *Nemeophila russula* in fine condition, *Bupalus piniaria* (the latter was very abundant), *Macaria liturata*, and other common things. The evening work was, as usual, a complete failure. On the 24th I was joined by a friend, but, though we worked the woods and heaths hard, we were only rewarded with *N. russula*, *Gonepteryx rhamni*, (very battered in nearly every instance), some clouded varieties of *Boarmia repandata*, *B. piniaria*, a pair of *Hepialus hectus*, and other insignificant captures, up till the 27th. All this time sugaring proved absolutely fruitless, the mixture seeming to be far more attractive to sundry slugs, of vast bulk and forbidding appearance, than to Noctuæ. On the 27th we tried larva beating, in the absence of all imagines, but with no result worth recording. At last we were favoured with a gleam of sunshine, and saw *Argynnis paphia*, evidently only just out, one *Thecla rubi*, a few *Lycana icarus* (*alexis*) and *ægon*, and *Cænonympha pamphilus*, as well as the usual swarms of *P. egeria*, *B. piniaria*, &c. I also got one *Drepana lacertula*, in fine condition, close to the spot where I had previously taken *D. falcula*. In the evening a few moths came to sugar, including *Aplecta nebulosa*, *Thyatira batis*, and *Noctua brunnea*. This was the wind-up to our visit, and we left next morning. I attribute our failure to three chief causes—bad weather, a late season, and the scarcity of Lepidoptera in general. For the most part the Sun refused to show himself, and the weather was ungenial. The fact that on our last day's excursion we found more variety in the species taken, coupled with the first appearance of Noctuæ at sugar, induces me to think that we should have done better a week or ten days later. Still it was only too painfully apparent that there was a deplorable dearth of Lepidoptera. Other orders of insects were largely represented, the flies in particular, to an extent which rendered them very troublesome; while the Stag Beetle by night, and *Libellula splendens* by day, literally swarmed. An ominous fact was the absolute dearth of Diurni, even of the commonest kinds, and *Limenitis sibylla* did not cross our path at all, though it should certainly have been out during the latter days of our stay. I believe a solitary

specimen actually was seen, but not taken, by an entomologist staying in the village. On comparing notes with him I found that, badly as we had fared, his bag was still scantier, and all the resident collectors with whom I conversed were unanimous as to the dearth of Lepidoptera this year.—E. G. ALDERSON; Worksop, Notts.

CAPTURES IN THE BRIGHTON DISTRICT.—With the primary object of obtaining specimens of *Agrotis cinerea* this year, I went down to Brighton on the 26th of May, and again on the 7th of June. On the first occasion I could only find one example of the particular insect I was in quest of, and this was a male specimen. The second expedition was attended with better success, as I found several pairs of the species, in splendid condition, sitting about on the Downs. I also captured a few more or less worn males, which were attracted to the light of my lamp. I may mention that the usually common species of *Pieris* appeared to be curiously rare, but *Euchloë cardamines* was neither more or less common than in other years when I have collected on the same ground. *Nemeobius lucina* and *Thecla rubi* were common on the 26th of May, but *Macroglossa fuciformis* and *M. bombyli-formis* were both very scarce on that date.—H. McARTHUR; 35, Averill Street, Fulham, S.W.

LEPIDOPTERA IN OXFORDSHIRE.—So far the season has been below the average, but some few species have been abundant. *Thecla rubi* appeared in abundance; so plentiful were they at the end of May that it would have been possible to have taken hundreds in a day. *Ino geryon* also was fairly plentiful. I captured about 200 specimens in a few evenings, and then left the remainder to breed. I failed to find this species on the hills attaining a height of 800 feet; but the lower slopes, especially the glades in beech woods, were the places for it. Among the butterflies plentiful this season have been *Argynnis euphrosyne*, *N. tages*, *S. malvæ* (*alveolus*), *L. astrarche* (*agestis*), *L. minima* (*alsus*). *L. argiolus* appeared sparingly. The July Fritillaries have not yet put in an appearance, owing probably to the wet weather. I caught over 200 *N. plantaginis* last week. This species is also very local, and frequents one wood only; searching in other woods proved a failure. In its particular haunts, however, it was a grand sight to see any number at the same time on the wing, and I am sure I do not exaggerate when I state that some thousands must have been hatched this year in that locality.—A. J. SPILLER; Chinnor, Oxon, July 3, 1890.

ABNORMAL EPINEPHELE IANIRA.—I see that Mr. Pearce, in his "Contributions to the Entomology of the Portsmouth District" (Entom. 230), says of *Epinephele ianira*:—"I have a very curious male, taken on Portsdown Hill in 1888; the right upper wing appears to have been tied round the centre in some way whilst developing." About a fortnight ago, on the 5th of this month, I captured a male of this species in Enfield, with the right upper wing wrinkled up round the centre in precisely the same manner. It was unable to fly much but kept on fluttering along in the grass, which drew my attention to it.—H. D. SYKES; "The Cedars," Enfield, July 19, 1890.

NOTE ON THE LIFE-HISTORY OF BOMBYX QUERCUS v. CALLUNÆ.—A few observations concerning the life-history of this species may be interesting to entomologists. On August 15th, last year, a female was captured at rest, which deposited a large batch of ova. After hatching

the larvæ were divided into four portions, three of which I gave to my friends, reserving the fourth for myself. Number 1 batch was kept in the living room all throughout their metamorphoses, and were fed on crab until September, when bramble was given. Growing rapidly, they attained their full growth and commenced to spin up at Christmas, the first imago (a female) appearing on July 1st, and one or more every day up to the time of writing. No. 2 batch were treated in a similar way to No. 1, but kept in the cellar of the house: this lot did not actually hibernate, as my friend told me that, when giving them fresh food (bramble), he found them crawling about; they commenced to prepare their cocoons May 27th, and up to the time of writing no imago had emerged. No. 3 batch were treated in a similar manner to No. 2, but, owing to some cause or other (probably damp), died off one by one. No. 4 batch (my own) were kept in a kind of shed sheltered from rain, and fed on crab up to the end of September; the crab then failing, the larvæ were placed out of doors, in a large cage specially prepared for them, with a good growing plant of bramble: they were examined from time to time, and it was noted that they only partially hibernated; they appeared to eat very little, and became a trifle smaller. The last winter, being very mild, not one died. About the middle of March I took them out of the cage, and placed them in the shed. When placed out for the winter they were about $1\frac{1}{2}$ in. long, and, although they had not grown during the winter, they were very lively, and to all appearance healthy. When the weather got warmer, and hawthorn and crab came into leaf, they were supplied with these, as well as bramble; the majority grew rapidly, attaining their full growth, and spun up by June 1st. The others are still feeding, and I do not expect they will pupate much before August, the usual time in a perfectly natural condition.—JOHN N. YOUNG; 85, Filey Road, Rotherham, July 3, 1890.

EUPITHECIA TOGATA, *E. VENOSATA*, AND *EMMELESIA ALBULATA*, TWO YEARS IN PUPA.—I have been breeding imagines of *Eupithecia togata* and *E. venosata*, also *Emmelesia albulata*, which were collected in Shetland as larvæ by the Messrs. Salvage in 1888, and have thus been two years in pupa. The first to emerge was *E. venosata*, on May 5th; *E. togata* made its appearance on May 19th; and the first *E. albulata* showed itself on June 17th. I can corroborate Mr. South's observations, in his interesting note on *E. togata* in 'The Entomologist' (No. 325, p. 205), as to the discrepancy in size, and colours, and markings of this species. One specimen which I have measures *very little over* half an inch, my largest insects being just an inch. Several had bright, claret-coloured bands when alive, fading in tint considerably after death. One specimen—my largest—has a broad, and dark red, band along the outer margins of both the fore and hind wings, making the white zigzag line more than ordinarily conspicuous. In some specimens there is scarcely any indication of this band. Kirby gives the following as a distinction between *E. abietaria* (Göze) and *E. togata* (Hüb.). He says *E. togata* is "most readily distinguished by its much shorter palpi, which are only a little longer than the head." There is a difference in the length of these organs in my specimens; but I could not pretend to separate them myself by this character.—JOSEPH ANDERSON, JUN. (Chichester).

A PLAGUE OF CATERPILLARS.—A correspondent states that it is many years since the fruit trees of Cheshire were so seriously damaged by cater-

pillars. In the Kelsall district there will be little fruit of any description, the apple, pear, and gooseberry trees especially being affected. The disappointment among market gardeners is all the keener, as there was a magnificent show of bloom. A serious plague of caterpillars has broken out in the rural districts around Southampton, doing immense damage to the fruit crops, which in many cases are totally destroyed.

[The above cutting, from a London weekly newspaper (May, 1890), is inserted here as it may thus come under the notice of entomologists residing in the districts mentioned, who will perhaps be good enough to give us further particulars.—ED.]

SMALL EXAMPLE OF *TEPHROSIA BIUNDULARIA*.—I have never seen an example of *T. crepuscularia* smaller than the one mentioned by Mr. T. B. Jefferys (Entom. 204); but my friend Mr. George Rose, of Barnsley, took a specimen of *T. biundularia* on a cottage window, near Barnsley, in June, 1887, that measures only *half an inch* from tip to tip. This insect was given to Mr. C. S. Gregson by Mr. Rose, and an account of it appeared in 'The Young Naturalist,' vol. viii., p. 181.—A. E. HALL; Norbury, Sheffield.

SATURNIA PAVONIA (= *CARPINI*) LARVA FEEDING ON OAK.—I had a pair of *Saturnia pavonia* emerge, and obtained about 150 eggs. Some forty of these proved fertile. As I was unable to obtain heath for the young larvæ I gave them bramble and oak together, but they would only eat the oak for the first fourteen days or so; at the end of the first fortnight they took to the bramble, and although I have offered them heath and oak several times since they will not touch it, but stick to the bramble, the flowers of which, when well open, they seem very partial to. The larvæ, at the present time about thirty in number, appear to have fed up very equally and to be quite healthy.—MARK H. WINKLEY; 9, Glen Eldon Road, Coventry Park, Streatham, July 10, 1890.

ACIDALIA RUSTICATA IN THE NORTH OF LONDON.—As this species seems to be of very local occurrence, it may be of some interest to the readers of 'The Entomologist' to mention that I took a specimen on Hampstead Heath in 1884. Unfortunately I was quite a beginner at the time, and consequently the specimen is not in such good condition as one could wish, being minus its abdomen: the wings, however, are not damaged in any way. I am afraid I cannot give the date of capture, as in those days I did not keep any regular diary. I see that Newman gives Darenth Wood and the Isle of Portland as the only localities for the species, and Stainton mentions only the Isle of Portland and Northfleet.—HENRY A. HILL; 132, Haverstock Hill, London, N.W.

LEPIDOPTERA ATTRACTED BY LIGHT AT SHEPHERD'S BUSH.—Although this has been to me a somewhat blank season, yet I have taken, for the first time in Shepherd's Bush, two good specimens of *Amphidasys betularia*, which flew into my bedroom on June 26th, attracted by the gaslight. I have also taken, through the same means, several specimens of *Euplexia lucipara*, in June; *Mamestra persicariæ*, commonly; *Triphæna pronuba*, in July, fresh and beautifully marked; *Melanippe fluctuata*; *Agrotis corticea*, one specimen; and *Acronycta aceris*, with well-defined black wing rays. I might mention that the hedges in North Acton, near Twyford Abbey Lane, were alive with *Camptogramma bilineata* on Sunday evening, July 6th, varying in shade from pale yellow to dark brown.—CHAS. E. M. INCE; 11, St. Stephen's Avenue, Shepherd's Bush, W.

CAPTURES AT LIGHT: DEVONSHIRE.—I beg to report the capture here, at light, of *Acronycta alni* on June 13th, and of *Dianthæcia albimacula* on June 15th. Both are perfect male specimens.—ALLAN NESBITT; Calverly, Seaton, Axminster.

TREATMENT OF PUPÆ DURING THE WINTER.—Can anyone advise me as to the best way of keeping pupæ alive through the winter? For my part I find the pupæ of many Lepidoptera a great deal harder to keep alive than the larvæ are to rear. I usually keep my pupæ in a wooden box or breeding-cage, with perforated zinc at the sides, upon some earth, with a layer of moss over them, and, for the sake of experiment, I have from time to time moistened some of the pupæ, others I have kept dry. The result of my experiments is that some pupæ—*e.g.* those of *Dicranura vinula*, *Smerinthus ocellatus*, *Phalera bucephala*—have nearly always duly produced imagines, under whatever conditions I may have kept them, and whether moist or dry. On the other hand, others—*e.g.* *S. populi*, and various kinds of Noctuæ and Geometræ—have nearly always died. I have consulted the Rev. J. Greene's 'Insect Hunter's Companion,' and find that he advises not moistening them; but I cannot account for the fact that scores of pupæ of various kinds, including many of the genus *Taniocampa* that I dug up last autumn, all died in the spring, although I had not moistened them. I opened some of them when the moths were about three weeks overdue, and found the imago perfectly formed, but dead and dried up. I have now, amongst other larvæ, about fifty of *Notodonta trepida* and three of *N. chaonia*, all of which I have reared from the egg, and they are perfectly healthy. I shall be extremely disappointed if I fail to get these through to the perfect state.—T. H. WOLLEY DOD; Wellington College, Wokingham.

CAPTURES AT SALLOWS IN IRELAND.—During the last few days of March and the first two of April, I took the following species at sallows in Co. Donegal:—*Taniocampa gothica* and *T. stabilis*, several; *T. incerta*, 2; *Calocampa exoleta*, *Scopelosoma satellitia* and *Xylina socia* (= *petrificata*), a few specimens of each. *T. gothica*, *T. stabilis*, and *S. satellitia* also occurred at sugar, and were accompanied by *Cerastis vacciniæ*. I do not see *X. socia* mentioned among the insects taken at sallows this year by your various correspondents (Entom. 200, 202, 234).—GEORGE HART; Woodside, Howth, Co. Dublin, June 23, 1890.

SESIA SPHEGIFORMIS IN ESSEX.—On June 16th I took a fine, freshly-emerged female of *S. sphegiformis* in Essex. It was quietly resting on an alder leaf.—J. A. COOPER; 1, Sussex Villas, Leytonstone, Essex.

CUCULLIA ABSINTHII AND ACIDALIA CONTIGUARIA NEAR BARMOUTH.—While staying at Arthog, near Barmouth, the first week in July, I took a specimen of *Cucullia absinthii*, which, I believe, has not been previously recorded from Wales. I also took one *Acidalia contiguaria*, which apparently is not recorded from anywhere else.—NEVILLE CHAMBERLAIN; Highbury, Moor Green, Birmingham.

SAPERDA CARCHARIAS AT CAMBRIDGE.—I have to note the capture of two specimens of *S. carcharias*, at Cambridge, during the later months of 1889. This species, I am told, only occurs in this neighbourhood, and has not, I believe, been taken at all recently.—F. A. HORT; 6, St. Peter's Terrace, Cambridge.

THE SUCCESSFUL MOTH-TRAP.—Having read Mr. Christy's interesting article on his moth-trap, I must say it seems to be very much like the American moth-trap; but I think the latter has an advantage in the drawer at bottom, as, by having this filled with fresh fine-cut laurel-leaves, the trapped insects are stupefied, if not killed; whereas without this the moths have full run of the trap. Another advantage I think rests with the American moth-trap—*i. e.*, Mr. Christy's trap allows the moth access to the portion K to B. In the American trap this K to B glass runs down into the trap, and joins the lamp protective glass at about figure G: thus the moths have no choice but to go downwards and inhale the poison. On the other hand the shadow partition, running from F up to the lamp-wick, is clearly an advantage, the moths below being nearly in darkness still I think, instead of the side-doors and shutters as in Mr. Christy's, a drawer should be added from D to C, running the whole size of bottom of trap. In this case it would not want the dark shutter of the American trap, but simply a deep drawer,—say $2\frac{1}{2}$ inches, quite plain, with $\frac{1}{2}$ -inch bed of chopped laurel-leaves at bottom. As Mr. Christy says, the wood warps, and causes the drawers and doors to fix; this is not so in the American trap, as it is all metal and glass only. I am not for one moment trying to run down Mr. Christy's trap in favour of the American, as I think that, with the drawer I mention and no side-doors, Mr. Christy's is even better than the American; but the addition of the poison-drawer is absolutely necessary to make it perfect.—EDWARD COOKE; 30, Museum Street, W.C.

LARVÆ OF TRIPHENA FIMBRIA.—For some years past it has been a puzzle to me why the mortality amongst the larvæ of *Triphena fimbria* should be so great. Last year I had a score or more of these larvæ, but I did not rear one imago. I believe that I have now solved the problem to some extent. This year, having collected a good number of the larvæ, I placed twenty in a cage by themselves; they all fed up well, and were down by the 20th of May. Contrary to my usual custom, I yesterday emptied the cage to examine the pupæ, and found five large cocoons of some ichneumon fly. Four of these I herewith send to you, and shall be glad if you can determine what they are.—JOHN M. YOUNG; Rotherham.

[The ichneumon is *Campoplex mixtus*, Grav.—T. R. B.]

PHIBALAPTERYX VITTATA AND AMPHIDASYS BETULARIA AT YEOVIL.—On the 12th instant a fine specimen of *Phibalapteryx vittata* (= *lignata*) came to light; and on the 22nd a large female *Amphidasys betularia* was picked up from the pavement near the centre of the town. Both are, I believe, new to the neighbourhood.—THOMAS PARMITER; 12, Camborne Grove, Yeovil, June 24, 1890.

STAUROPUS FAGI NEAR READING.—On May 26th I took *Stauropus fagi* (female) in an old beech wood near Caversham. It was at rest on the trunk of a beech tree, some seven feet from the ground. I may add that one other specimen has been taken in the same wood this year, and one imago and one larva last year.—J. CLARKE; Carey Street, Reading, June 17, 1890.

DILOBA CÆRULEOCEPHALA FEEDING ON CHERRY LAUREL.—I have just had larvæ of *Diloba cæruleocephala* brought me, found feeding on cherry laurel; and as it seems to me a very unusual food for these larvæ, I should like to know if any of your readers have ever found them feeding on this shrub.—W. E. BUTLER; 297, Oxford Road, Reading, June 16, 1890.

HETEROGENEA (LIMACODES) ASELLA IN DEVON.—Whilst out beating for larvæ with a friend, on the afternoon of June 20th, in the Plym Valley, I was surprised to find in my umbrella a male and female of the above species *in cop.* According to Newman, Westwood and Humphrey, and Stainton's 'Manual,' this species has only been taken in Hampshire.* If this be still the case this species is new to the Western counties.—F. J. BRIGGS; Fursdon, Egg Buckland.

NOTE ON CRABRO INTERRUPTUS.—I am happy to say this wasp has again appeared in the garden here, driving holes in the old elm stump in which it took up its abode last year, and in another old elm stump about one hundred yards away. It is a curious sight to see the wasps carrying bluebottle flies, which seem to be their principal, or at any rate, favourite diet, into their borings. The fleshy parts of the bodies are the parts fed upon, and the wings and hard external parts are thrown out of the borings, and may be seen amongst the heap of wood-dust outside. Last year the *Crabro* was present in fair numbers about the latter end of August and September, and judging from the quantity of wood-dust now being thrown out in making the borings, I should think it will be plentiful again this year. I am in doubt whether the insects have one common nest, and whether the various borings converge on one point, or whether each *Crabro* and its family have their own habitation; but certainly more than one *Crabro*, even at this period of the year, enter the same hole, and there seems to be one principal entrance larger than the others; moreover they are using some of the holes made by their ancestors last year. Perhaps some of your correspondents acquainted with the insect's habits will kindly give me this information. From the report in the 'Entomologist' of last December of the Entomological Society's meeting, held on November 6th last, at which a specimen caught by me was exhibited, it would appear that the *Crabro* exhibited was a solitary specimen found by me in "a hole in a log;" but this is not so, as I merely caught the specimen exhibited for the purpose of having the species identified, and I could have captured a good many had I so desired.—FRANCIS C. WOODBRIDGE; "Old Bank" House, Uxbridge, July 17, 1890.

INO GERYON IN BERKSHIRE.—Amongst moths captured here, within the last few days, a male specimen of *Ino (Procris) geryon* has been taken; and a nearly full-grown larva of *Dasychira fascelina* was found on an oak.—J. M. BACON; Eagle House, Sandhurst, Berks, June 2, 1890.

SIREX GIGAS NEAR PLYMOUTH.—To-day I secured a fine female of the above species, which flew into a greenhouse in the garden here. I thought at first that it was a hornet, from the loud buzzing noise it made, but soon saw that I was mistaken. I had never previously taken or seen it here.—F. J. BRIGGS; Fursdon, Egg Buckland, June 22, 1890.

HESPERIA LINEOLA.—The third excursion of the South London Entomological and Natural History Society was to Leigh, in Essex, where, conducted by Mr. Carrington, the party, twenty in number, had a good time with *Hesperia lineola*, the newest English thing in the way of butterflies. The individual "takes" varied from twenty specimens to a single example. So far as I could learn there was only one gentleman who failed to secure the coveted species. Although he netted a good number of "skippers," they all proved, on inspection, to be *H. thaumas*.—R. S.

* [Stainton gives Lyndhurst and Worthing.—ED.]

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*July 2nd, 1890.*—Prof. J. O. Westwood, M.A., F.L.S., Hon. Life-President, in the chair. Mr. J. B. Hodgkinson, Ashton-on-Ribble, Preston, Lancashire, and Mrs. Bazett, Springfield, Reading, were elected Fellows; and Mr. Henn was admitted into the Society. Lord Walsingham exhibited some rare Micro-Lepidoptera collected by himself at Cannes, including *Eudemis helichrysana*, *Conchylis rubricana*, Millière; a new *Depressaria* from *Opoanax cheironium*, which is about to be described by M. A. Constant, and *Bucculatrix helichrysella*; and also a volume of drawings of larvæ of the genus *Eupithecia*, by Mr. Buckler, which formerly belonged to the late Rev. H. Harpur Crewe. Mr. M'Lachlan exhibited larvæ and cocoons of *Mecyna deprivalis*, Walk., sent by Mr. W. W. Smith, of Ashburton, New Zealand; the species feeds commonly on *Genista capensis*, an introduced plant. Mr. M'Lachlan remarked on the curious nature of the larva, and suggested that as the species was so closely allied to *M. polygonalis*, so extremely rare in this country, they might be interesting to British lepidopterists. Mr. Jacoby exhibited abnormal specimens of a phytophagous beetle, *Metaxonycha tridentata*, Jac., in which one side of the thorax was furnished with teeth as in the type, whereas the other side was quite simple, and presented no trace of teeth. The Secretary, on behalf of Mr. J. Edwards, exhibited specimens of *Gyrinus colymbus*, Er., with specimens of *G. elongatus*, Aubé, for comparison; he also exhibited drawings of the œdeagus of both species proving their distinctness. Mr. Bower exhibited *Phoxopteryx upupana*, bred from larvæ feeding between united birch leaves at Chiselhurst, Sept., 1889; and *Scardia picarella*, bred from fungus collected in Durham in May, 1870. Mr. S. Stevens, in speaking of a tour which he had lately made in Devonshire, remarked on the extreme scarcity of insects on the coast of that county as compared with the coasts of Kent and Sussex; there were very few larvæ, and the vegetation was very luxuriant and very little eaten; he thought it possible that the reason of the scarcity was the heavy rainfall of South Devon, which washed off and destroyed the young larvæ. Mr. Barrett said that his experience had been the same, and that he put it down to the violence of the winds, which beat the insects from the trees. Mr. Blandford remarked that he had found Coleoptera abundant on the Branton Burrows, near Barnstaple, but very scarce in other localities. Mr. Mason and others took part in the discussion which followed. Mr. Stevens further said that when at Exeter he visited the Museum, and was pleased to see the original specimen of *Plusia ni* in the late Mr. H. Dorville's collection, taken at Alphington, near Exeter, in August, 1868, and a specimen of *Callimorpha hera*, taken also at Alphington in August, 1871, which is about six miles from the locality in which the latter insect is now said to occur; both the specimens are in fine condition. Prof. Westwood read a paper on a species of *Aphis*, received from Mr. E. Ernest Green, of Ceylon, affecting the bread-fruit tree, which he had named *Siphonophora artocarpi*; at the conclusion of his paper he alluded to the use of Paris-green as a destructive agent for insects. Mr. Blandford then made some remarks as to the use of London-purple (another arsenic compound) as an insecticide in the place of Paris-green; he stated that the compound was a waste product and one-tenth the cost of Paris-green, and further that it was more soluble and more easily applied; he was also of opinion that arsenic compounds do

not greatly affect sucking insects, such as Aphides, the ordinary kerosene preparations being more suitable for their destruction. Several Fellows took part in the discussion that followed.—W. W. FOWLER, *Hon. Sec.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY. —June 26th, 1890. —J. T. Carrington, F.L.S., President, in the chair. Mr. Hawes exhibited larvæ of *Thecla rubi*, L., feeding on broom, upon which Mr. Hawes stated he saw the ova deposited. Mr. R. Adkin, a bred series of *Epione advenaria*, Hb., &c. Mr. Turner, the *gracilis* form of *Taniocampa stabilis*, View. Mr. Robinson, a long series of *Sesia sphegiformis*, Fb., from Sussex, about half of them having been taken by "assembling," the remainder being bred by him. Mr. Mansbridge, a fine variety of *Cænonympha pamphilus*, L. Mr. South, on behalf of Mr. Leech, a number of Micro-Lepidoptera collected in Normandy, and commented on the fact that, with one exception, all the species occurred in this country. Mr. C. Fenn, two dark specimens of *Eupithecia rectangulata*, L.; also Tortrices taken and bred by him this year, from the South of London, including a fine series of *Tortrix branderiana*, St. Mr. Cockerell, a larva of *Taniocampa incerta*, Hufn., found feeding on the leaves of mulberry. Mr. Billups, on behalf of Mr. Leech, types of forty species of Coleoptera, one of Ichneumonidæ, one of Diptera, and one of Homoptera, from Normandy, nearly the whole of which were represented in this country. Mr. Billups' other exhibits were twenty-nine species of Diptera, twenty-three of Hymenoptera, five of Coleoptera, two of Hemiptera, and one each of Homoptera and Neuroptera,—in all 104 insects, representing ten families, taken at the Society's excursion to Mickleham, on the 21st of June. (See list of species, ante p. 256). Mr. Mansbridge, *Leptida brevipennis*, Mils., and in reply to Mr. Billups said he believed there were some wicker baskets stored where they were captured. Mr. Billups said that the specimens had probably been brought here in these; some years before a number of Dutch baskets were stored in the Borough Market, and from these a quantity of the species now exhibited were bred. Mr. Tugwell showed a collection of plants from the North. A discussion on the effect of temperature affecting the emergences of Lepidoptera, in which Messrs. Carrington, Fenn, Tutt, Tugwell, South and Adkin took part, brought the meeting to a close.

July 10th, 1890.—Mr. W. H. Tugwell, Vice-President, in the chair. The Rev. C. Thornehill, Rev. E. C. Dobrée-Fox, and Mr. B. A. Bristowe, were elected members. Mr. Wellman exhibited a variable series of one hundred examples of *Eupithecia rectangulata*, L., taken at Streatham Hill, from six apple trees; *Dianthæcia cucubali*, Fues., Liverpool; *D. carpophaga*, Bork., var. *capsophila*, Dup., from Isle of Man and S. Scotland; *D. nana*, Rott., from Surrey and Ireland. Mr. Jäger, also *D. carpophaga*, from South Wales, and the variety *capsophila*, from the Isle of Man, and *D. casia*, Bork., from the same locality. Mr. R. Adkin, *Coremia designata*, Hufn., from Surrey, varying in width and density of coloration of central band; also *Eupithecia nanata*, Hb., from Hants and Surrey; and called attention to the extreme variability of the species. Some observations were made on the latter exhibit of Mr. Adkin, in the course of which Mr. C. G. Barrett and Mr. Tutt expressed opinions that *curzoni* was only an extreme form of *E. saturata*. Mr. Gerrard showed *Emydia cribrum*, L., and case of *Psyche villosella*, Och., from the New Forest. Mr. Mansbridge, *Xylophasia rurea*, Fb., var. *combusta*, Dup. Mr. Dennis, a pale specimen of *Argynnis euphrosyne*, L., from Dorking. Mr. Croker, *Nola cucullatella*,

L., from Kent. Mr. E. Joy, *Meliana flammea*, Curt., and *Nascia ciliaris*, Hb., from Wicken Fen. Mr. Howard Vaughan, *Melitæa aurinia*, Roth., *Cænonympha typhon*, Roth., *Nemeophila russula*, L., *Crambus sylvellus*, Hb., *Scopalis ambigua*, Tr., and var. *atomalis*, from North Knapdale; *S. ambigua* var. *atomalis*, *Hypsipetes trifasciata*, Bork., and *Coremia designata*, &c., from Kilmartin parish, Argyllshire; dark forms of *Larentia viridaria*, Fb., and two male *Procris* which differed considerably from *P. statice*, and upon the identity of which the members did not hazard an opinion. Mr. Vaughan remarked that they appeared to him to be intermediate between *statice* and *globulariæ*. Adverting to Colonel Blathwart's communication to the 'Entomologist's Monthly Magazine' for the month of April last, p. 109, Mr. Jenner Weir exhibited specimens of the two forms of *Volucella bombylans* which mimicked *Bombus lapidarius* and *Bombus terrestris* respectively, stating that he fully concurred with the Colonel in considering that this remarkable dimorphic condition of the *Volucella* assisted it to become parasitic upon two species of *Bombus* differing both in colour and markings. He also exhibited a specimen of the *Volucella* which he had recently taken at Bournemouth, in which the mimicking was imperfect, inasmuch as the arrangement of the colour resembled that of *Bombus lapidarius*, but instead of the hairs at the end of the abdomen being red they were of a yellowish colour, as in the mimic of *Bombus terrestris*. He showed also a specimen of the large worker of *Formica rufa* to the antenna of which was attached, by the closed jaws, the head and part of the thorax of another ant with which no doubt it had fought and destroyed the abdomen and most of the thorax of its adversary, but could not detach the head.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—
 July 17th.—Mr. J. A. Clark, President, in the chair. Mr. A. H. C. Hamilton, of Cheverton Road, N., was elected a member of the Society. Mr. Lewcock exhibited *Philonthus decorum*, from Highgate; and *Liophlæus nubilus*, from Claygate; also, on behalf of Mr. Cripps, *Grammoptera præusta*, *Toxotus meridianus*, and *Silpha 4-punctata*, taken on hawthorn at Brockenhurst during Whitsuntide. Mr. Heasler, *Harpalus servus*, *Calathus fuscus*, *Panagæus 4-pustulatus*, *Amara ovata*, and numerous other species of Coleoptera from Deal sandhills. Mr. Clark, a box containing beetles captured at sugar at Brockenhurst, including *Carabus catenulatus*, *Pterostichus niger*, *Anchomenus junceus*, &c. Lepidoptera: Mr. Clark exhibited *Emmelsia decolorata*, Hb., bred from larvæ received from north of Ireland, and a variety of *Ematurga atomaria*, L., from Brockenhurst. Mr. Bellamy, *Thyatira batis*, L., *Miana arcuosa*, L., and vars. of *Abraxas grossulariata*, L. Mr. Gurney announced that since last meeting he had bred several more *Phorodesma smaragdaria*, Fb. Mr. Battley, while sugaring at Southwell, had captured some three dozen species, including *Nola cucullatella*, L. (on the wing between 12 and 1 at night), and several *Miana arcuosa*, L. The latter insect first appeared at 9.30, crawling up the stems of grass, remaining there until 11.30; flight then took place for about an hour, when it again sought the grass stems. Mr. Lewcock read portions of a letter received from Mr. P. W. Jarvis (of Cape Town), referring to the method of capturing certain species of Cicindelidæ in South Africa. The beetles referred to inhabit the coast, and are found just above high-water mark. Having procured a piece of a whale's rib-bone about a foot long (common in these parts), a certain sandhill is selected for operations, which are commenced by carefully scraping the sand away, taking but a thin

shave at a time, and continuing until a depth of four or five inches is reached; if nothing is found, a move is made a few feet further, and the scraping again proceeds. If fortunate, out runs a fine amber-coloured tiger beetle; if two are found in a sandhill, operations are carried on until the whole of the surface is removed, and all the beetles are captured. *Cicindela capensis*, a pretty tiger beetle about the size of the British *C. campestris*, but brown, with longitudinal irregular lines, is frequently found in this manner on the South African coast.—G. A. LEWCOCK and E. HANES, *Hon. Secs.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—June 16, 1890.—Mr. W. G. Blatch, President, in the chair. Mr. Herbert Stone presented a number of dried plants to form the basis of a herbarium for the Society's use. Mr. E. C. Tye showed larvæ of *Lobophora viretata*. Mr. R. C. Bradley showed a long and variable series of *Selenia tetralunaria*. Mr. W. G. Blatch exhibited the following Coleoptera from Bewdley, all being new to the locality:—*Perileptus areolatus*, *Homalota longula*, *H. subtilissima*, *Scopaus* — sp. ? (same as the one exhibited on June 2nd, and taken at Ludlow), *Thinobius longipennis*, *Calodera umbrosa*, *Trogophlæus subtilis*, and *Actidium concolor*; the last two species being also new to the Midlands. Dr. P. B. Mason then exhibited his Icelandic insects, and made remarks on them. He described the country and the difficulties of collecting there; he related all that had hitherto been known of Icelandic Entomology, and he gave a complete list of the insects he had taken, and made many interesting remarks on them. The list has already appeared in the Ent. Mo. Mag. for July. The great peculiarity about the insect fauna is the entire absence of Rhopalocera and Orthoptera.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

REVIEW.

The Lepidopterous Fauna of Lancashire and Cheshire. By JOHN W. ELLIS, M.B.(Vic.), F.E.S. 8vo, pp. 136. Leeds, 1890.

A most useful annotated list of the lepidopterous insects found in Lancashire and Cheshire. Of the 2079 species known to occur in Britain the author enumerates 1355 as found in his district.

The arrangement of the Macro-lepidoptera is in accordance with that adopted by Kirby in 'European Butterflies and Moths,' whilst the Micro-lepidoptera are arranged as in Dr. M. Wocke's portion of the 'Catalog der Lepidopteren des Europäischen Faunengebiets.'

OBITUARY.

WITH very great regret we have to record the death of WILLIAM CLAYTON, of Wadworth Wood House, who died on June 9th, 1890, at the early age of twenty-one years. Mr. John N. Young, of Rotherham, writes of the deceased as follows;—"Living at the edge of the wood, he had a grand opportunity of working up the insect fauna of the district, and of this he was not slow to avail himself. He was always most willing to give information and assistance to entomologists visiting the wood at any time. The frequent visits of myself and other brethren of the net were always a source of real pleasure to him. Always a pleasant companion, a sincere friend, and a most enthusiastic collector, he will be sorely missed, not only by his sorrowing parents and family, but by his entomological friends and correspondents."



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12

West, Newman } lith.
(Horace Knight)

Deltoids Pyralides, Crambi & Plusia Moneta.

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ADDITIONS TO THE BRITISH LIST OF DELTOIDS, PYRALIDES, AND CRAMBI, SINCE 1859.

BY RICHARD SOUTH.

(PLATES III. & IV.)

SINCE the publication of the second volume of Stainton's 'Manual of British Butterflies and Moths,' in 1859, a large number of additions have been made to the British list; but in the present paper it is not proposed to do more than bring together the various Deltoids, Pyralides, and Crambi which have been introduced as British species since the year adverted to. Several of the insects brought forward as new to science have been, by a consensus of opinion, reduced to varietal rank; others have had their right and title to specific rank vigorously assailed; and it seems probable that their degradation, by common consent, is fast approaching, and that their fate will not be relegated to the dim and distant future to decide. The earliest English descriptions have been reprinted in the majority of cases, and the references to the British literature, though probably not exhaustive, will perhaps be of some service to those who may be interested in the matter. Two of the species had a place in our lists previous to 1859, but were not included in the 'Manual.'

To those gentlemen who, in the kindest way, have placed their valuable specimens at my disposal for figuring, I tender my most sincere thanks.

DELTOIDS.

HERMINIIDÆ.

ZANCLOGNATHA EMORTUALIS, *Schiff.* (Pl. III. fig. 1.)

BRITISH REFERENCES:—

Polypogon emortualis, Steph. Cat. ii. p. 158 (1829).

Æthia emortualis, Steph. Ill. Brit. Ent. Haust. iv. p. 18 (1834).

ENTOM.—SEPT. 1890.

X

Sophronia emortualis, H. Cooke, Intell. v. p. 123 (1859); Stainton, Entom. Ann. 1860, p. 132; Birks, Intell. ix. p. 28 (1860); Doubl. List, p. 37.

Zanclognatha emortualis, South, Syn. List, p. 11; Leech, Brit. Pyral. p. 3, pl. i. fig. 8 (1886).

Expanse, 1 in. 3 lines. Light yellowish olive. The fore wings are traversed by two whitish lines, the first almost straight, the second curved and continued across the hind wings; between the lines on fore wings is a short whitish lunulated line.

DISTRIBUTION.—Central Europe; Sweden; Livonia; Piedmont; Dalmatia; Ural; Amur.

Note.—Stephens described this insect in 1834, but his description does not appear to be very accurate. He remarks, "A specimen is in the cabinet of W. Swainson, Esq.; and I possess one captured in Devonshire." Wood's figure (768) of *emortualis*, in the Westwood edition of the 'Index Entomologicus,' is suggestive of *derivalis*, rather than the species it is said to represent. Altogether there seems to have been some hesitation on the part of British entomologists with regard to the right of *emortualis* to a place in our lists; and it was not until the year 1859 that anything further was heard of the species. In the year last mentioned, Mr. H. Cooke recorded and described a specimen which had been taken by Mr. Pocock in Brighton, on the 18th of June, 1858. In the year following, the Rev. B. H. Birks, of Stonor, Henley-on-Thames, took a specimen at sugar on the 12th of July. These are the only records of the capture of this species in Britain that I can find.

HYPENIDÆ.

HYPENA OBSITALIS, Hübner. (Pl. IV. fig. 9.)

BRIT. REF. :—

Hypena obsitalis, Cambridge, Entom. xvii. p. 265 (woodcut), (1884); P. Dors. N. H. S. vi. pl. iii.; Leech, Pyral. p. 7, pl. xiii. fig. 7 (1886).

Expanse, 1 in. 3 lines. Fore wings broad, pointed at the tips. Brown, with numerous fine transverse darker lines; beyond the middle is a thicker dark angulated line, edged externally with pale brown, especially near the costa; submarginal line represented by some minute white dots placed on the nervules, and there are some black longitudinal streaks below apex. The stigmata are black, but hardly well defined. Hind wings fuscous-brown, venation and central lunule darker.

Var. *a*.—Expanse, 1 in. 5 lines. Fore wings pale reddish brown, without fine transverse lines; the angulated line is preceded by a broad triangular blackish patch enclosing the stigmata; a smaller blackish patch on the outer margin below apex.

Larva bright yellowish green, with a dark dorsal and pale subdorsal lines. Feeds in May on *Parietaria* (pellitory), Leech.

DISTRIBUTION.—Southern Europe; Carniola; N. W. Asia Minor; Cyprus; Syria; Armenia; Algiers and N. Morocco; Canaries; England.

Note.—So far only one example of this species has occurred in Britain. This specimen, which is of the typical form, was found by the Rev. O. Pickard Cambridge, on the 21st September, 1884, resting on a door-jamb in his garden at Bloxworth, Dorsetshire. The descriptions of the imago, given above, were taken from specimens captured by Mr. Leech at Mogador.

PYRALIDES.

PYRALIDIDÆ.

PYRALIS LIENIGIALIS, Zell. (Pl. IV. fig. 13.)

BRIT. REF. :—

Pyralis lienigialis, Thompson, Entom. xiv. p. 84; Carrington, *op. cit.*, p. 304, pl. i. fig. 21; South, Syn. List, p. 17; Leech, Brit. Pyral. p. 13, pl. vii. fig. 1.

Asopia lienigialis, Thompson, Barrett, and Stainton, Ent. Mo. Mag. xvii. p. 256.

Mr. Barrett (*l.c.*) finds that although some specimens of *P. lienigialis* may resemble *P. farinalis* in colour, the first whitish line of the former is "nearer the middle of the wing, the basal blotch being therefore larger and the median area smaller"; the second line commences as a pale blotch on the costa, and is more regularly curved than in *farinalis*. "In the hind wings the first delicate pale striga, which in *farinalis* forms a continuation of the first line on the fore wings, is, in *lienigialis*, placed more perpendicularly, so that it originates *opposite the middle of the basal blotch of the fore wings*."

DISTRIBUTION.—Livonia; Finland; England.

Note.—Captured at light in August, 1879, by Mr. Thompson, at Stoney Stratford, Bucks, and introduced by him in April, 1881. Other specimens were taken by Messrs. Thompson and Bryan; August and September, 1880.

SCOPARIA BASISTRIGALIS.

BRIT. REF. :—

Scoparia basistrigalis, Knaggs, Ent. Mo. Mag. iii. p. 1 (wood-cut); v. p. 293, pl. i. fig. 6; Briggs, Entom. xviii. p. 130; xx. p. 17; xxii. p. 17; Tutt and Briggs, E. M. M. xxvi. p. 51; Porritt, *op. cit.* p. 88; Entom. xii. p. 225; Doubl. List, Suppl. p. 2; South, Syn. List, p. 17; Leech, Brit. Pyral. p. 14, pl. xiv. fig. 4.

Expanse, 9—10½ lines. "Fore wings in both sexes broad, of rhomboidal shape... ground colour clear greyish white, thickly sprinkled with numerous black atoms. Basal area with two short distinct black streaks passing from the base of the wing along the subcostal and median nervures respectively.... First line, commencing obliquely from the costa, passes backwards and inwards to the orbicular stigma, thence forwards and inwards to meet the claviform stigma, which is incorporated with (not detached from, as in some of the genus) this line, and finally, with an S-like bend, reaches the inner

margin. Medial area; the orbicular and reniform stigmata are situated on patches of dark fuscous colour, the black outline of the latter (the reniform, or 8-mark) forming an 8-like mark. . . . Hind wings silky white, with a very slight fuscous tint."

The above description is abridged from that given by Dr. Knaggs (Ent. M. M. iii. p. 1), who adds that the only *Scoparia* with which one could confound *basistrigalis* is *ambigualis*, "but the greater width of fore wing, giving the appearance of its being actually shorter, . . . together with the distinct basal streaks, the oblique commencement of the first line, &c., are amply sufficient to separate it from that insect."

Introduced by Dr. Knaggs in June, 1866.

BRITISH LOCALITIES.—Surrey; Sussex; Worcestershire; Yorkshire.

Note.—Our knowledge of the distribution of this species is not altogether satisfactory. Mr. Tutt says that he has the species from almost every locality he has worked; whilst Mr. Porritt is of opinion that many of the supposed *S. basistrigalis* in collections are not that species at all, but merely forms of *S. ambigualis*. The latter gentleman records the occurrence of large numbers of *basistrigalis* in Edlington Wood, near Doncaster, on August 4th, 1879.

SCOPARIA ZELLERI, *Wocke*.

BRIT. REF.:—

Scoparia zelleri, Hearder and Knaggs, Ent. Mo. Mag. v. pp. 131, 293, pl. i. fig. 7; Knaggs, Ent. Ann. 1869, p. 126; Jordan, E. M. M. vi. p. 14; Thompson, E. M. M. vii. p. 86; Briggs, Entom. xviii. 130; Doubl. List, Suppl. p. 2; South, Syn. List, p. 17; Leech, Brit. Pyral. p. 13, pl. xiv. fig. 2.

"Nearly allied to *S. ambigualis*, but it is considerably larger than that species. It is also broader in the fore wing, the apical margin of which is a trifle more vertical; the whitish ground colour stands out more conspicuously on either side of the central fascia; the apical aspect of the central fascia (*i. e.*, the second line) is more deeply crenated than in *ambigualis*. Mr. Horton's example exceeds in alar expanse the largest *cembræ* with which I have yet met" (Knaggs).

Introduced by Dr. Hearder, October, 1868. The first specimen noticed in Britain was that taken by the Rev. E. Horton, in Dr. Hearder's dining-room at Carmarthen, in July, 1868; but Mr. H. Pryer captured a specimen on the 17th of August of the year previous, at Norwood.

DISTRIBUTION.—Silesia; Central and Western France; England.

Note.—*Zelleri* is probably only a form of *S. cembræ*.

SCOPARIA SCOTICA.

BRIT. REF.:—

Scoparia scotica, White, Ent. Mo. Mag. viii. p. 169; Weston, Entom. x. p. 92; Briggs, Entom. xviii. p. 130; Doubl. List, Suppl. p. 2; South, Syn. List, p. 17; Leech, Brit. Pyral. p. 14, pl. xiv. fig. 3.

"Closely allied to *Scoparia cembræ*, from which it differs in the front wings being less oblong, and more triangular and dilated before the hind margin, as well as by the breadth across the hind margin being greater in proportion to the length of the wing" (White).

Introduced by Dr. Buchanan White, January, 1872. Habitat, Scotland.

Note.—*Scotica* differs from *cembræ* in colour and intensity of markings; thus, the fore wings are grey instead of brownish, and the lines and stigmata are more conspicuous. Most entomologists, however, will accept the dictum of the late Mr. Weston, who wrote of *scotica*, in 1877:—"Must, I fear, stand only as a variety of *S. cembræ*. Even its sponsor is, I think, now of this opinion."

SCOPARIA INGRATELLA, Zell.

BRIT. REF.:—

Scoparia ingratella, Knaggs, Ent. Mo. Mag. iv. p. 61; Ent. Ann. 1868, p. 109; E. M. M. v. p. 293, pl. i. fig. 2; Weston, Entom. x. p. 92; Briggs, Entom. xviii. p. 130; Bankes, E. M. M. xxiii. p. 258; Tutt, Entom. xix. p. 129; E. M. M. xxiv. p. 42; Doubl. List, Suppl. p. 2; South, Syn. List, p. 17; Leech, Brit. Pyral. p. 16, pl. xiv. fig. 10.

Comparing it with *S. dubitalis*, Hübn., Dr. Knaggs says that *ingratella* is much larger in size, "the black markings are absent or very faint." He concludes his remarks by observing that "although there can be no doubt that the Folkestone specimens are specifically identical with the continental *ingratella*, I am by no means over positive that both may not possibly some day turn out to be varieties of *pyralis* (= *dubitalis*), which is certainly an excessively variable species." Mr. Weston says that "Mr. Machin reared *ingratella* from larvæ in the roots of sorrel, collected at Folkestone in April, 1867."

Introduced by Dr. Knaggs in August, 1867.

DISTRIBUTION.—Austria; Hungary; Switzerland; Dalmatia; Syria; Armenia; England.

SCOPARIA ULMELLA, Dale MS.

BRIT. REF.:—

Scoparia ulmella, Knaggs, Ent. Mo. Mag. iii. p. 217 (woodcut), v. pl. i. fig. 12; Ent. Ann. 1868, p. 109; Briggs, Entom. xviii. p. 130; xx. p. 17; Doubl. List, Suppl. p. 2; South, Syn. List, p. 17; Leech, Brit. Pyral. p. 15, pl. xiv. fig. 8.

Eudorea ulmella (Dale), Mason, Ent. Mo. Mag. xxiii. p. 163 (woodcut).

Eudorea conspicalis, Hodgn., Entom. xiv. p. 223 (Oct. 1881), pl. i. figs. 8, 9 (Dec. 1881); Ent. Mo. Mag. xviii. p. 134 (Nov. 1881); Mason, E. M. M. xxiii. p. 163.

Scoparia conspicalis, South, Syn. List, p. 17; Leech, Brit. Pyral. p. 15, pl. xiv. fig. 7.

"*S. ulmella* bears some affinity to *S. dubitalis*, chiefly by reason of the 8-mark being dumb-bell shaped, and filled in with ochreous, but its slender conformation precludes the possibility of its being connected with that species. The characters of the 8-mark separate it from the *mercurella* group, and it is with equal ease distinguished from the *angustea* group by the character of the first line" (Knaggs).

Introduced by Dr. Knaggs, March, 1867.

Note.—Three examples of this species were taken by Mr. Dale on a trunk of wych elm, at East Meon, July, 1844. Nothing further seems to have been heard of the insect until a *Scoparia* was turned up in some numbers in the North of England by Mr. Hodgkinson, and subsequently by Mr. Prest and others. The former gentleman considered the species new to science, and described it under the name of *conspicalis*; but Dr. Mason as recently demonstrated that Hodgkinson's insect is identical with *ulmella*, Dale.

BOTYDÆ.

MECYNA POLYGONALIS, Hübn. (Pl. III. fig. 7.)

BRIT. REF. :—

Margaritia diversalis (Hübn.), Steph. Ill. Brit. Ent. Haust. iv. p. 47 (1834); Wood, Index (Westw. Ed.), p. 124, pl. 28, fig. 807.

Mecyna polygonalis, Newman, Entom. v. p. 32; Doubleday, *op. cit.* p. 76; Haggard, Entom. viii. p. 300; Weston, Entom. x. p. 92; Tugwell, *op. cit.* p. 255; Doubl. List, p. 18; South, Syn. List, p. 18; Leech, Brit. Pyral, p. 32, pl. iv. fig. 3.

Expanse 15—18 lines. Fore wings: basal half and outer fourth dark brown or blackish, the space between grey-brown or whitish grey; orbicular dot-like, reniform well-defined, both black; first line oblique and wavy, the basal area within this line is sometimes paler; second line serrated, elbowed below costa, approximating to first line on inner margin. Hind wings yellow, broadly bordered with black.

The above description is drawn from specimens from Lebanon, for which I am indebted to Mr. Leech.

Ab. diversalis. "Head, thorax, and anterior wings yellowish brown, the latter with two obscure wavy streaks, with two dusky spots between, one small, the other larger and reniform; on the extreme hinder margin is a row of minute black dots, cilia yellowish brown: posterior wings dull orange-yellow, with an

irregular interrupted dusky fascia on the hinder margin; cilia dusky yellow." (Stephens.) An example of this form in the British Museum collection, was taken near Bristol, in July, 1815.

BRITISH LOCALITIES.—Bristol; Folkestone; Bury St. Edmunds.

DISTRIBUTION.—Central and Southern Europe; Syria; Canaries.

Note.—This species varies considerably in tone and intensity of colour of forewings, and the black border of hind wings is subject to modification as regards its breadth, in some examples this band is contracted, and in others interrupted before the anal angle.

BOTYS REPANDALIS, Schiff. (Pl. IV. fig. 6.)

BRIT. REF.:—

Botys repandalis, Barrett, Ent. Mo. Mag. xxiii. p. 145.

"Closely allied to *hyalinalis* and *pandalis*, but of a paler yellow, and decidedly smaller than either, being of about the size of *verbascalis*, but with narrower fore wings. The fore wings are of a delicate pale straw-colour, and the markings, which closely resemble those of *hyalinalis*, are of a faint yellowish grey. The first line is comparatively straight, the second also straight from the middle of the dorsal margin to the middle of the wing, where it touches the discal streak or stigma, then turns abruptly towards the hind margin, and makes a wide sweep before turning again towards the costa; the third is parallel with the hind margin. These three lines are continued upon the silky whitish hind wings" (Barrett).

Introduced by Mr. Barrett, December, 1886.

DISTRIBUTION.—Central and Southern Europe.

Note.—Bred some years previous to 1866 by the Rev. Henry Burney, who reared specimens from larvæ found feeding, in June, in the heads of young shoots of *Verbascum nigrum*, growing on the south coast of Devonshire. The larva is described as "Yellowish white, with black spots."

EBULEA STACHYDALIS, Zinck. (Pl. IV. fig. 10.)

BRIT. REF.:—

Ebulea stachydalis, Barrett, Ent. Mo. Mag. xii. p. 158; xiii. p. 93; xiv. p. 159; Carrington, Entom. x. p. 81 (woodcut); Bond. Proc. Ent. Soc. Lond. 1876; Buckler, E. M. M. xiii. p. 133 (larva); McLachlan, *op. cit.* p. 64; Jeffrey, E. M. M. xiv. p. 115; Rogers, Entom. xvi. p. 46; South, Syn. List, p. 18; Leech, Brit. Pyral. p. 39, pl. v. fig. 3.

Usually smaller than *E. sambucalis*, which in colour and marking it greatly resembles, but the pale yellow or whitish triangular spot placed below the larger square spot on the fore wing of that species is absent in *stachydalis*, and the submarginal line, composed of pale yellow or whitish spots in both species, is

curved but not indented below the costa as in *sambucalis*; again, in *stachydalis*, the first three spots are but little, if any, larger than the others in the series forming the line. On the hind wings the two outer spots are almost confluent in *sambucalis*, but in *stachydalis* they are widely separated, one is near the costa and in conjunction with the central spot, and a submarginal chain of smaller spots, form a fairly distinct ring around what would be in *sambucalis* the lower discal spot.

The larva feeds in September on *Stachys sylvatica*, on the leaves of which it "lives in a sort of tube, formed either by turning down the tip of a leaf, and folding it closely on to the under surface with a quantity of silk, or else by drawing together a fold of the under surface, and covering it over with a thick silken web, in either case leaving an opening at each end" (Buckler).

Introduced by Mr. Barrett, December, 1875. Occurs in several English localities.

DISTRIBUTION.—Central Europe; Sardinia.

PSAMOTIS PULVERALIS, Hübn. (Pl. IV. fig. 1.)

BRIT. REF. :—

Lemiodes pulveralis, Meek, Ent. Mo. Mag. vi. p. 141; Entom. v. p. 31; Knaggs, Ent. Ann. 1870, p. 140; E. M. M. xi. p. 117; Cooke, E. M. M. vii. p. 86; Barrett, *op. cit.* p. 111; Doubl. List, Suppl. p. 2; Weston, Entom. x. p. 92; Ragonot, E. M. M. xvi. p. 271.

Psamotis pulveralis, South, Syn. List, p. 18; Leech, Brit. Pyral. p. 41, pl. v. fig. 7.

Expanse $10\frac{1}{2}$ —14 lines. ♂. Pale ochreous brown sprinkled with black atoms; first line straight, brown, but not clearly defined; second line brown, oblique, and slightly curved below costa. Hind wings rather paler, with a distinct brown transverse central line; all the wings have a submarginal fuscous shade-like band, and the space between this and 2nd line appears paler, distinctly so in some specimens. Fringes silky, preceded by a thin brown line. ♀. Similar to the male, but the wings are less ample.

Mr. Ragonot says that Herr Mühlig has found the larva on *Mentha aquatica* in August, but it has not been described.

Introduced by Mr. E. G. Meek, November, 1869. The species is now in most collections, but has become scarce, if not quite extinct in its original haunt, the Warren, at Folkestone.

BRITISH LOCALITIES.—Isle of Wight; Folkestone; Ranworth.

DISTRIBUTION.—Central and South Eastern Europe; Armenia.

Note.—The specimens described by Stephens in 1834 (Ill. Brit. Lep. Haust. iv. p. 55) as *P. pulveralis*, are referable to *Botys fuscalis*, Schiff.

MARGARODES UNIONALIS, Hübn. (Pl. III. fig. 3.)

BRIT. REF. :—

Margarodes unionalis, Stainton, Intell. vii. p. 19; Ent. Ann. 1860. p. 133, pl. i. fig. 4; Steward, Zool. 1861, p. 7799;

Tugwell, Entom. x. p. 255; Crewe, *op. cit.* p. 296; E. M. M. xiv. p. 149; Mathew, *op. cit.* p. 157; Knaggs, Ent. Ann. 1870, p. 127; Doubl. List, Suppl. p. 2; South, Syn. List, p. 18; Leech, Brit. Pyral. p. 44, pl. v. fig. 12.

"It is paler than *Palealis*, whiter and more iridescent, but has a brownish streak along the costa, edged below with yellowish, and there is a row of minute black dots along this yellowish border and on the hind margin, also a black dot at the termination of the discoidal cell of the anterior wings. Size 1 in. 2 lines" (Stainton).

Introduced by Mr. Stainton, October, 1859.

BRITISH LOCALITIES.—Torquay; Kent, S. Coast; Tresco; Gravesend; Forest Hill; Isle of Wight; Brighton.

DISTRIBUTION.—South Europe; England.

Note.—Mr. Pearce informs me that he captured a specimen at a street lamp in Gosport, on October 23rd, 1884.

STENIIDÆ.

DIASEMIA RAMBURIALIS, Dup. (Pl. III. fig. 10.)

BRIT. REF. :—

Diasemia ramburialis, Boyd, Intell. iv. p. 151; Stainton, Ent. Ann. 1859, p. 149, pl. i. fig. 3; Verrall, Ent. Mo. Mag. iii. p. 163; Purdey, Entom. xi. p. 273; Salwey, Entom. xiii. p. 283; Digby, E. M. M. xxv. p. 381; Doubl. List, p. 17; South, Syn. List, p. 18; Leech, Brit. Pyral. p. 45, pl. vi. fig. 2.

"Closely allied to *Literalis*, but more glossy, and the markings more irregular" (Boyd).

Introduced by Mr. Boyd, August, 1858.

ENGLISH LOCALITIES.—Probus, Cornwall; Lewes; Folkestone; Dover; Portland.

DISTRIBUTION.—South Western Europe; Austria; England; Australia.

Note.—This species is said to fly in swampy places at dusk, and has been beaten from the flowers of hemp agrimony (*Eupatorium cannabinum*). Has been taken in June, July, September and October, so that it is probably double-brooded.

ANTIGASTRA CATALAUNALIS, Dup. (Pl. III. fig. 4.)

BRIT. REF. :—

Ebulea catalaunalis, Stainton, Ent. Mo. Mag. iv. p. 152; Knaggs, Ent. Ann. 1868, p. 108, pl. i. fig. 4. Doubl. List, Suppl. p. 2.

Antigastra catalaunalis, South, Syn. List, p. 18; Leech, Brit. Pyral. p. 45, pl. vi. fig. 3.

"The ground colour of the fore wings is pale sulphur, the nervures being mapped out with ferruginous, an accumulation of which tint occurs towards the hind margin; at the base of the

cilia is a dark, almost black line; the fringes themselves are cream-coloured; the hind wings are whitish, but ferruginous towards the hind-margin, especially near the apex. Abdomen and antennæ long. Sexes very much alike" (Knaggs).

Introduced by Mr. Stainton, December, 1867.

ENGLISH LOCALITY.—Cheshunt.

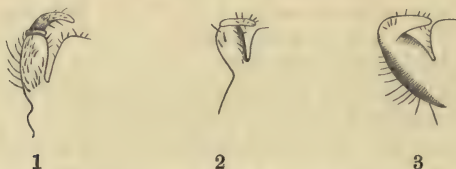
DISTRIBUTION.—South Western Europe; Syria; Bengal; England.

Note.—Dr. Knaggs says this species had been previously reputed British, but this was a mistake, and arose from the fact that *catalaunalis* was supposed to be synonymous with *Nascia ciliaris*, Hübn.

(To be continued.)

NOTES ON SOME SPECIES OF GALL-GNATS (CECIDOMYLÆ).

By T. D. A. COCKERELL.



♂ GENITALIA OF *Cecidomyia* (all enlarged).

1. *C. s-batatas*, ♂ forceps. 2. *C. frater*, ♂ forceps. 3. *C. s-brassicoides*, ♂ forceps.

WHILE living in Colorado I was able to breed several of the species of gall-gnats found in that state, but could never work out their nomenclature in a satisfactory way, not having access to sufficient of the literature of the subject. Now, however, I have been able to make the proper enquiries and comparisons, and present some of the results herewith.

The galls produced by the species of *Cecidomyia* are very various in form, and of great interest from several points of view. They are also, as a rule, not difficult to identify. The gall-makers, on the other hand, are often very closely allied, and exceedingly hard to name even when alive; dead specimens become so shrivelled as to become almost useless unless something is known of their life-history. Probably nearly all the species which have been described by Walker and others, from dead specimens which have no history, will have to be put aside as unrecognisable.

CECIDOMYIA RIGIDÆ, *Osten-Sacken*.

= *salicis*, Fitch, non Schr. = *salicis-siliqua*, Walsh (var.).

Gall.—A red fusiform swelling on the twigs of *Salix*, tapering at either end, and often emitting one or more small twigs. These galls are smooth

and red like the twigs on which they grow; they appear to have their origin in aborted buds; they contain a single cavity.

Larva.—Long. 4, lat. $1\frac{1}{2}$ mm. Subcylindrical, bright orange, tinged with crimson above. (Extracted from gall Jan 27th, 1890.)

Pupa-shell.—Larger than that of *C. s-batatas*. Coverings of antennæ, legs and wings grey, in striking contrast to the white abdomen.

Imago.—Long. $4\frac{1}{2}$, al. exp. 9 mm. ♀. Antennæ 20-jointed.

The above description refers to the species found at West Cliff, Colorado, which I have hitherto called *C. s-siliqua*. It is very probably identical with Walsh's species, but on the whole it agrees better with *rigidæ*, as described by Fitch. Walsh describes *salicis-siliqua* as having the origin of the anterior branch of the third longitudinal vein pretty distinct, which is not the case with my species, but Walsh admits *s-siliqua* to be variable in this respect.

The *West Cliff species* has the thorax dull black, with rather coarse pale hairs at the sides; halteres brownish; abdomen dull dark brown or brown-black, clothed at sides and beneath with white hairs. Legs grey-brown, pink at joints; wings hyaline, veins brown. These notes are from fresh specimens, which emerged from the galls in May, 1890. Fitch's species is said to have the tarsi black, and the wings smoky brown.

I think the Colorado species may be safely referred to *rigidæ*. and Walsh's *salicis-saliqua* (a later name) to a variety of the same species. Still it is possible that Walsh's insect may be distinct.

CECIDOMYIA SALICIS-BATATAS, Walsh, 1864.

? = *spongivora*, Barnst. MS., Walker, 1848.

Gall.—A large, irregularly oval gall, at the end of a willow twig.

Pupa-shell.—Almost entirely white.

Imago.—♂. Long. $2\frac{1}{2}$ al. exp. 6 mm. Wings hyaline, pale greyish; third longitudinal vein very indistinct beyond the branch, or sometimes more distinct; second longitudinal vein conspicuous, and a lively brown, whereas the other veins are dark grey or black. Antennæ apparently 17-jointed. Thorax dark reddish brown, with subdorsal longitudinal lines of pale hairs; halteres greyish, pale at tips. Abdomen dark brown, the segments very distinct, covered with white hairs except at sutures beneath, and above the lower edge of each segment strongly fringed with long white hairs. Legs brown, pale at joints. (Described from fresh specimens.)

Hab. West Cliff, Custer Co., Colorado. Emerged from gall May 21st, 1889.

I have no doubt that the above species belongs with Walsh's *s-batatas*, although Walsh thought, "unless his memory failed him," that the male abdomen of his species was luteous when recent.

As to *spongivora*, so far as the description goes, it might well be this species. I have examined the types of *spongivora*, Barnst. MS., in the British Museum, and they agree in size and general appearance with the Colorado *s-batatas*. The thorax is dark, but the legs are rather paler than in the Colorado form:

the wings also are rather less ample perhaps, and rather straighter along the costa. A female specimen has a long, pale ovipositor. There is a label, presumably written by Barnston, "15 out round gall," with another word I fail to decipher.

There is, therefore, every probability that *spongivora* is the same as *s-batatas*; but under the circumstances I should hardly be justified in overthrowing Walsh's well-known name for an older one, which, after all, may possibly belong to something different.

With the types of *spongivora* in the British Museum there is a second species from Hudson's Bay, labelled (apparently by Barnston) "*lasiopterides*, from willow-rose." It is certainly different from *spongivora*, having a sand-coloured thorax with two dark longitudinal bands. I am not aware that this *C. lasiopterides* has been described, and it would hardly be wise to attempt a description from the Museum material.

CECIDOMYIA SALICIS-BRASSICOIDES, Walsh.

Imago.—♂. Long. 3, al. exp. 3 mm. Head black; antennæ with abundant long white hairs. Thorax black; halteres dark grey. Abdomen black or nearly so, with sparse long hairs; genitalia everted on a pedicel, inclined upwards; forceps black (pale at ends), greatly curved; style brownish, broad and thick. Legs grey-brown. Wings hyaline; venation as in *C. rigidæ*.

Described from fresh specimens, bred from galls on willow, West Cliff, Colorado, May, 1889.

This is the species, very common at West Cliff, which I have before called *s-strobiloides*, it having been so named for me at Washington. I think there is no doubt that it is really Walsh's *s-brassicoides*, with which the galls especially agree more than with any other described species.

These West Cliff galls occur in bunches, several together, as is described by Walsh, and are very suggestive of compact sprouts on a cabbage-stump; they taper somewhat at the end, being obversely pyriform; the leaves or scales covering them are mostly rounded.

CECIDOMYIA FRATER, n. sp. (vel *orbitalis*, Walsh, var.?).

Imago.—♂. About 2 mm. long. Halteres pinkish. Abdomen somewhat pinkish. Venation as in *C. bigeloviae*. Antennæ about 18-jointed. Otherwise much like *C. s-brassicoides*, except in genitalia.

Hab. West Cliff, Colorado. Bred May 19th, 1889, from gall of *C. s-brassicoides*.

This is clearly not Walsh's *C. cornuta*, but it is evidently very close to *C. orbitalis*. I should hesitate about describing it were it not that the male genitalia afford an easy means of distinguishing it from *s-brassicoides*, the terminal portion of the forceps being much more slender, and with coarser hairs, than in that species. In *C. s-batatas* (West Cliff examples) the terminal joint of the

forceps is still narrower in proportion to its length, *frater* being thus intermediate in this respect.

CECIDOMYIA ALTICOLA, n. sp.

Gall.—Globular wool-like galls, with radiating fibres, being the aborted flower-heads of a species of Compositæ. I collected these galls when the plant had died down, and only the dead stalks were left: it seems to be a *Chrysopsis* or *Solidago*.

Larva.—Colour orange.

Pupa-shell.—Long. $1\frac{2}{3}$ mill. White, with the thoracic coverings shiny grey.

Imago.—Expanse about 4 mill. Head dark; eyes very black; antennæ brownish, moniliform, 16-jointed, each joint emitting some (twelve or more) long white hairs; joints diminishing in size towards tip. Thorax dark. Legs brownish; halteres large, slightly hairy, tinged with reddish. Abdomen reddish or pale brown, the male genitalia much darker. Wings hyaline, with a row of strong bristles on the costa, and a strong fringe on inferior border. Venation simple; second longitudinal vein straight, fading towards margin, or reaching margin perhaps slightly below the apex of the wing; third longitudinal vein fading, or (in one male) curving abruptly downwards, reaching inferior margin, with no anterior branch.

Female abdomen redder than that of male; ovipositor very short.

Male genitalia differ from those of *Diplosis pyrivora* as follows:—In *C. alticola* the hairs of the first joint of the forceps are longer; and the second joint of forceps is less slender and less curved, being in fact quite thick.

One male appeared to have the antennæ 11-jointed only, but I am not sure that some joints had not been broken off.

Described from fresh specimens, bred April 24th (some earlier), from galls collected in 1890, at West Cliff, Colorado.

Many Cecids have been bred by different authors from species of Compositæ, but the present species seems quite distinct from all of them.

Of the American species *C. hirtipes*, O.-S., *C. solidaginis*, Lw., *C. racemicola*, O.-S., *C. anthophila*, O.-S., and *C. carbonifera*, O.-S., all on *Solidago*, make quite different galls from *alticola*. *C. anthophila*, which might possibly be confused with our species as to its gall, has also a quite different fly, with pale brown thorax and twenty-one antennal joints. *C. chrysopsidis*, Lw., makes a gall on *Chrysopsis mariana* which seems to be exceedingly like that of *alticola*, but the imago is different. There are also American species of *Asphondylia* and *Lasioptera* on Compositæ, but these need not be considered.

The European *C. obfuscata*, Mg., is said to have brown bands on the tibiæ and tarsi, but otherwise the imago seems a good deal like *alticola*, though it has a different life-history. *C. floricola*, Winn., is also rather like our species, but differs in a few points, besides breeding in *Achillea*. The recently described *C. florum*, Kieffer (Ent. Nach. 1890, p. 37), is evidently distinct; it feeds on

Artemisia, as do also *C. artemisiæ*, Bouch., *C. tubifex*, Bouch., and *C. foliorum*, Scholtz.

Inquilines and Parasites.

The following have been bred from galls, collected at West Cliff, Colorado, of the species considered above:—

- (1.) *Nematus concolor*, Nort. Bred May 15th, from gall of *C. rigidæ*.
- (2.) Pteromalid, long $2\frac{3}{4}$ mill. Bronzy green. Bred, May, 1889, from gall of *C. s-brassicoides*.
- (3.) Pteromalid, long, about $2\frac{1}{2}$ mill. Bronzy; legs partly dark brown and partly honey-yellow. Bred, May, from gall of *C. s-brassicoides*.
- (4.) *Eutelus* sp., about $1\frac{1}{2}$ mill. long. Yellowish green; legs pale yellow; venation yellow. Bred, May, from gall of *C. s-brassicoides*.
- (5.) *Eutelus* sp., similar to the last, but much smaller; abdomen more tapering. Bred, May, from gall of *C. s-brassicoides*.
- (6.) Pteromalid, rather smaller than No. 4. Black. Bred, May, from gall of *C. s-brassicoides*.
- (7.) Chalcid. Metallic greenish; legs pale brownish; antennæ pale at tips. Bred, May, from gall of *C. s-brassicoides*.
- (8.) Chalcid. Black or nearly so; head greenish; shape of abdomen rather like that of *Isosoma*. Bred, May, from gall of *C. s-brassicoides*.
- (9.) *Cecidomyia*, much like *frater*, but much smaller. Not sufficiently examined, but may be *albovittata*, Walsh. Bred, May, from gall of *C. s-brassicoides*.
- (10.) Chalcid. Black; legs honey-yellow; thorax smooth; flagellum pubescent. Bred, May, from gall of *C. s-brassicoides*.
- (11.) *Polygnotus error*, Fitch. Bred from gall of *C. s-brassicoides*.
- (12.) *Torymus* sp. Bred from gall of *C. rigidæ*.
- (13.) *Torymus* sp. Bred from gall of *C. s-brassicoides*.
- (14.) *Tetrastichus* sp. Bred from gall of *C. s-batatas*.
- (15.) *Torymus* (n. sp.?). Bred from gall of *C. alticola*.

I am indebted to Mr. W. H. Ashmead and the U.S. Department of Agriculture for assistance with the above Hymenoptera. The Chalcids have not been sufficiently studied as yet; probably some of the species bred will ultimately prove undescribed.

3, Fairfax Road, Bedford Park, Chiswick, London, W., July 11, 1890.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

BY F. H. PERRY COSTE, F.C.S.

(Continued from p. 252).

V.—THE CHEMICAL ASPECT.

A.

AT the close of Section IV. I wrote,* “It now remains to discuss the significance of these results, and offer such interpretation of them as we can.” That is the task that is to be essayed in the remaining portion of these articles, and I am not unconscious of the fact that my interpretations may have to run the gauntlet of some criticism from readers of ‘The Entomologist.’ So far, in recording experiments and observations, I have been on fairly sure ground, but must now quit that for the region of hypotheses; far less certain ground, indeed, but yet without such hypothesising the most complete and extensive experiments and observations are almost valueless. We cannot mentally feed on several hundred isolated individual facts; such cannot be assimilated, nor will they conduce to mental growth any more than physically we can feed on atoms of carbon and nitrogen, &c., in place of bread or meat. In both cases some preliminary elaboration of the individual items is requisite; and possibly, if we had been suddenly set down to discover in what manner the physical ultimates of food must be combined for our physical sustenance, there would have been as many disastrous failures to prepare food as there have been in all early attempts to work up a true mental pabulum! As Heidenhain truly says, “It is the fate of every investigation into natural science that, after the establishment of a series of connected facts which can be objectively observed, an hypothesis must be established which brings these facts into causal connection with one another.” And this hypothesis must be necessarily more or less tentative at first, until verified or disproved by further experiments; a working hypothesis, in fact, which shall collect together for the present, into a compact and assimilable form, all the individual facts, and suggest fresh experiments the necessity for which would probably have not otherwise been perceived. It is in this light—as indeed I have before implied—that I wish my interpretations to be read; and if in succeeding articles I may appear to be advancing too confidently theories for which some readers may think the present evidence altogether too insufficient, I will, in anticipation, refer them to this preliminary disclaimer. It is far more simple and less cumbersome to explain this once for all than to preface every individual hypothesis with “Let it, for the purposes of the present enquiry, be considered probable *that* ——”! After this candid

* Entom. p. 223.

confession I shall consider myself very badly treated if any readers accuse me of dogmatism or illicit assumption; and as to the appropriateness or otherwise of such working hypotheses, I may remind them that these articles were headed "Preliminary Notices,"—being indeed merely an account (published at this somewhat early stage for reasons explained in the first section) of preliminary experiments on British Lepidoptera, by way of preparation for a considerably more extensive enquiry.

Now before considering the actual experiments, we shall, I think, do well to clear the ground of one or two matters, rather than plunge at once *in medias res*. These articles are entitled "On the *Chemistry* of Insect Colours," and there has, so far, been allowed perhaps a tacit assumption that there is a chemistry of—*all*—insect colours. Whereas there is not. It is superfluous for me to remind readers of 'The Entomologist' that it has long since been opined by various naturalists that in many cases the colours of insects are due,—not to any pigment at all, but to the minute *physical* structure of the surface; and this class of colours may be conveniently, though somewhat loosely, referred to as *physical* colours, in distinction from *chemical* or *pigment* colours. Readers of Wallace's delightful book, 'Tropical Nature,' will remember that he alludes on several occasions to these "physical colours,"—especially with reference to Lepidoptera and other insects. For instance, he conjectures that "many of the glossy or metallic tints of insects, as well as those of the feathers of some birds," are due to interference colours; and states also that "The iridescent colours of the wings of dragon-flies are caused by the superposition of two or more transparent lamellæ, while the shining blue of the purple emperor and other butterflies, and the intensely metallic colours of humming-birds, are probably due to fine striæ."* Then, again, Mr. Cockerell† quotes Dr. Dimmock as opining that the white of *Pieris* and the silver of (*e. g.*) *Argynnis* are both due to physical structure, and not to any pigment. So that clearly naturalists have long been fully awake to the fact that in discussing the colours of insects (and other groups) we must discriminate between the chemical and the physical colours; although I am not aware that there has so far been much formal evidence forthcoming concerning these physical colours.‡

* On the other hand Wallace, I think, goes too far in stating that pigmental colours "comprise all the opaque colours of flowers and insects." I should call *Pieris*-white, for instance, a very opaque colour; and among Heterocera opaque colours are abundant which are—so far, that is, as I can at present determine—not pigment colours,

† Entom. xxii. 126-7.

‡ At least, not until very lately. I see, however, by a recent article in 'Nature,' that Dr. Hodgkinson has published a paper on the "Physical Cause of Colour," recording experiments tending to show whether the colour is caused by a structure of thin plates or of fine lines. I have, however, not yet had an opportunity of consulting Dr. Hodgkinson's paper.

This being so, there is some consolation to me for the (chemically) negative and disappointing results of so many of my experiments, in the reflection that they have at any rate served to confirm the opinions previously put forth on wholly different grounds by various naturalists. But to this point we will return subsequently.

Now, with a view to classifying lucidly the explanations that I shall have to give of the various colour phenomena under discussion, I wish at this point to propose a subdivision of these *physical* colours into several classes, although in so doing it is not easy to avoid making somewhat arbitrary distinctions; but it must be remembered that these subdivisions are proposed with special reference to these experiments. From Wallace's view, as expressed in the statement* that "the colours which we perceive in material substances are produced either by the absorption or by the interference of some of the rays which form white light, Pigmental or Absorption colours," &c., I must dissent; for this appears to me to be both an incomplete account and also to confuse two different classes—or, if you like, sub-classes—under the one term of absorption colours. The subdivision now proposed is as follows:—

First, *Interference* colours — whether of films or fine lines (striated surfaces). Inorganic examples are, — of films, soap-bubbles, the colours of molten metals, iridescent glass, stagnant water, and so on: of striations, the colours of mother-of-pearl,† "shot"-silk, &c.

Secondly, *Reflection* "colours" — other than interference colours. Of course all interference colours *as seen on the wings of birds and insects*† are reflected; but under this class-heading I am denoting such "colours" as are produced by simple reflection without the interference colours due to films or striations. Under this subdivision we shall be chiefly concerned with the "colours" of white-winged species, and also apparently of the "metallic" markings displayed by *Argynnis*, *Plusia*, &c. It is almost superfluous to instance as inorganic examples such objects as white paper, and the like large category, for the former; whilst as regards "metallic or quasi-metallic reflection," it has been also pointed out to me that, besides the coloration of polished metals in this manner, another example is afforded by the colours of aniline dyes under certain circumstances,—*e.g.*, when a drop has been spilled on the neck of the bottle, and dried there.

* 'Tropical Nature,' pp. 182-3.

† If a mother-of-pearl shell be impressed upon wax, the colours will be found transferred to the wax also; clearly demonstrating them to be due to a surface structure.

‡ Unless we looked *through* the gauzy wings of Neuroptera, &c., in which case we should see similar (unreflected) interference colours in positions complementary to the reflected colours seen from above.

Thirdly, it seems to me that we ought to rank those colours which are due to the partial or total *absorption* of light rays, whereby either a complementary colour or a simple black is produced. It may well seem at first blush that this third class is altogether erroneous and superfluous, since the definition of it is the definition of the pigment class. For all that we mean by a pigment—strictly—is a compound of such molecular structure that it absorbs many or few, or all or none, of the light rays, producing complementary colours, or black, or white. Nevertheless, I feel it necessary to constitute this third class in order to accommodate colours that are apparently caused by absorption, but cannot anyhow be chemically affected as one would expect pigment colours to be. If asked to instance an *inorganic* colour of this class, I could not do better than point to a lump of coal as a thoroughly characteristic example; and no doubt various other examples will occur to my readers.

Of course I am fully aware how very arbitrary and artificial—in final analysis—any distinction between chemical and “physical” colours is. In the first place, all these sub-classes may be said to overlap more or less: as already pointed out, reflected colours and interference colours approach one another; similarly reflected and absorption colours also approximate in character*; and, lastly, all pigment colours are only a special case of absorption colours. Moreover, ultimately, all colours are physical; that is to say, the only objective antecedent of the sensations that we call colour is to be found in the inconceivably minute molecular structure of matter, which so affects the ether vibrations as to produce in us the sensations of colour. In this sense, therefore, all colours—whether pure pigment colours, or interference colours, or absorption colours—are *physical*. But, nevertheless, it is eminently convenient to distinguish between, on the one hand, chemical colours, due to pigments, which may be isolated and utilised as such; and, on the other hand, “physical” colours, in the usual restricted and well understood use of the term. Always bearing in mind, then, the caution just posited, we may freely speak of chemical and physical colours, and need not trouble just now to determine where, in absorption* colours, the physical ends and the chemical begins. After all, this is no more perplexing or arbitrary than the division between the overlapping sciences of Physics and Chemistry,—a division that is purely arbitrary and subjective, but very convenient for the purposes of human study; only Nature knows nothing of any such distinction.

Let us, then, during the rest of this discussion, assume that there are at least four classes of colours:—

- | | | |
|-------------------------|--------------|--|
| 1. Chemical or Pigment. | 2. Physical. | $\left\{ \begin{array}{l} a. \text{ Interference colours.} \\ b. \text{ Reflected colours.} \\ c. \text{ Absorption colours.} \end{array} \right.$ |
| | | |
| | | |

* See preceding footnote.

My objection, then, to Wallace's treatment would be that he has taken no cognizance of these absorption (and reflected) colours; whereas it appears to me possible to interpret a large number of my experimental results only on the assumption that many colours are due to "absorption," and belong to Class 2 c. And in thus speaking I have especially in view the very "unsatisfactory" (to repeat my previous designation) colours—black, brown, grey, and such like. For the rest, reflection colours (Class 2 b) will, as already pointed out, include all the whites and silvers, and metallic colours generally. Class 2 a (interference colours) includes some blues, metallic greens, &c. Reds are entirely pigment colours; so probably are yellows, though we have some knotty points to settle here, as will have been observed, no doubt, by any of my readers that have examined in detail the tables of results. Greens, too, and chestnuts, and (some?) blues, are also pigment colours.

(To be continued.)

AN ADDITION TO THE PLUSIIDÆ OF BRITAIN.

BY RICHARD SOUTH.

(PLATE III. FIG. 6.)

PLUSIA MONETA.

Noctua moneta, Fabr. Mant. Ins. ii. 162; Hübn. Eur. Schmett. fig. 289; Dup. Léop. Fr. vii. pl. 139, fig. 2; Frey. Beit. ii. pl. 71.

Noctua flavago (*Argyritis*, text), Esp. Schmett. iv. 218, pl. 112, fig. 1.

Noctua napelli, Vill. Ent. Linn. p. 347, pl. v. fig. 21.

Polychrysis moneta, Hübn. Verz. Schmett. p. 251, No. 2492.

Plusia moneta, Treit. Schmett. v. 3, 158; Guen. Noct. ii. p. 332, No. 1146; Walk. Cat. Lep. Het. p. 889; Staud. Cat. p. 125, No. 1764; Kirby, Eur. Butt. & Moths, p. 261; Hofm. Gross.-Schmett. Eur. p. 111.

Expanse, 1 in. 9 lines. Fore wings pale golden tinged with grey; transverse lines and venation on the disc, brown; the costal half of central third suffused with brown; first line double, curved and indented at the median nervure, second line starts obliquely from the costa, then turns inwards and forms a series of curves to the inner margin; between these lines is a narrow brown band which is angulated at the 2nd median nervule; before the apex is a brown oblique streak from costa to outer margin, where it terminates in a broader longitudinal dash of the same colour; below this brown dash is a broad stripe of pale brown, with a few black dots between the nervules; beyond, the outer margin is tinged with violet. In the central area is a silvery ring, separated by the median nervure from a larger curved mark of the same colour; this last is intersected by the 1st median nervule, and both have a yellowish tinge. Hind wings pale brown, suffused with fuscous,

especially on the outer third; lunule and central line blackish, but the former is not always distinct. Fringes pale brown preceded by a dark line.

One example taken in Sussex by Mr. Christy, who found it in his moth-trap on the 2nd of July last (Entom. 254).

Kirby says the larva is grass-green with white dots, a dark line down the back, and a white one along the sides. Feeds on monkshood (*Aconitum napellus*) from autumn to June. Guenée remarks that DeVillers found a pupa between leaves of the food-plant. The imago is on the wing in June and July according to Hofmann, but Guenée gives July and September.

I am obliged to Mr. W. M. Christy, of Watergate, Emsworth, for the loan of this most interesting addition to our small band of native Plusiidae. As the larva and its food-plant are known, it is to be hoped that the species may be detected here in the earlier stages also.

The figure represents Mr. Christy's specimen, but the description has been drawn up from a fine bred example in Mr. Leech's European collection.

DISTRIBUTION.—Germany (except N.W.); Switzerland; South-east France; Normandy; Andalusia; Piedmont; Austria; Hungary; Poland; Finland; Central and South-east Russia; Altai; East Siberia; England.

FIVE DAYS' COLLECTING IN NORMANDY.

By J. H. LEECH, B.A., F.L.S., &c.

ON Friday, July 18th, I made another excursion to Tancarville, accompanied by Mr. South and Mr. H. McArthur. During the time we spent in the locality the weather was not altogether unfavourable for entomological work. The days were warm enough; there was a fair amount of sunshine and but little rain, except on the morning of the 21st. Although the nights were certainly cold at times, the meteorological conditions were a distinct improvement on those which obtained during our former visit.

A full list of the species captured on this occasion is appended. Those species met with as imagines during our previous visit, and enumerated in the June list (*ante* p. 225), are indicated by an asterisk.

LIST OF LEPIDOPTERA TAKEN AT TANCARVILLE, JULY 19TH—23RD, 1890.

RHOPALOCERA.—*Pieris brassicæ* and *P. napi*. *Argynnis euphrosyne*, one male specimen. *Vanessa c-album*, one. *V. polychloros*. *V. urticæ*. *Limenitis sibylla*. *Apatura iris*, represented by two wings found on the road below castle. *Melanargia galatea*. *Epinephele ianira*, one female example has the usual fulvous markings of fore wings replaced by whitish except the costal portion of submarginal band. *E. tithonus*. *E. hyper-*

anthes. *Cænonympha arcania*. *C. pamphilus*. *Thecla ilicis*. *Polyommatus phlæas*. *Lycæna icarus*.* *L. argiolus*. *Hesperia thaumas*. *H. lineola*, the latter very common. *H. sylvanus*.*

HETEROCERA.

SPHINGES.—*Smerinthus populi*. *Macroglossa stellatarum*. *Trochilium apiformis*. *Thyris fenestrella*. *Zygæna filipendulæ*, not common.

BOMBYCES.—*Nola cucullatella*. *Calligenia miniata*.* *Lithosia mesomella*. *Gnophria quadra*. *Euchelia jacobææ*.* *Callimorpha dominula*, common in a wood at the back of the hotel. *Arctia caia*, one larva. *Spilosoma fuliginosa*, one full-grown larva. *Hepialus humuli*, one female example. *Psilura monacha*, pupæ on tree trunks. *Bombyx neustria*. *Saturnia pavonia*, one larva feeding on stunted sallow in the quarry below castle. *Dicranura vinula*, full-grown larva. *Notodonta dictæa*, one larva. *Drynobia velitaris*, one female specimen. *Phalera bucephala*, larvæ. *Thyatira derasa*. *T. batis*.* *Cymatophora octogesima* (= *ocularis*). *C. or.* *C. duplaris*. The *Cymatophoridae* were taken at sugar, as also were the following:—

NOCTUÆ.—*Acronycta psi*.* *A. leporina*. *A. aceris*. *A. megacephala*. *A. rumicis*.* *A. auricoma*. *Leucania lithargyria*, variable. *L. pallens*. *Hydræcia nictitans*. *Xylophasia lithoxylea*. *X. hepatica*. *Apamea didyma* (= *oculea*), many forms. *Miana strigilis*.* *Caradrina taraxaci* (= *blanda*). *Rusina tenebrosa*.* *Agrotis suffusa*. *A. exclamationis*.* *A. ripæ*. *Noctua triangularum*. *N. brunnea*.* *N. baia*, some nice forms. *Triphæna pronuba*.* *Miana maura*. *Calymnia trapezina*. *C. affinis*. *Euplexia lucipara*.* *Hadena oleracea*. *Gonoptera libatrix*. *Plusia gamma*.* *Phytometra viridaria*. *Herminia derivalis* and *Hyphenodes costæstrigalis* were taken on the wing, and larvæ were obtained of *Dianthæcia albinacula*. *Cucullia verbasci* * and *C. lychnitis* ?

GEOMETRÆ.—*Epione apiciaria*. *Angerona prunaria*. *Selenia bilunaria* v. *juliaria*. *Crocallis elinguaris*. *Eugonia quercinaria* (= *angularis*). *Boarmia repandata*.* *Hemithea strigata* (= *thymiaria*). *Acidalia bisetata*. *A. dilutaria*. *A. remutaria*. *A. strigilaria*, not uncommon. *A. inornata*. *Timandra amatoria*. *Cabera pusaria*.* *C. exanthemata*.* *Abraaxa grossulariata*.* *Lomaspilis marginata*.* *Emmelesia alchemillata*. *Eupithecia impurata*. *Hypsipetes sordidata* (= *elutata*). *Melanippe sociata*. *M. galiata*, larvæ. *Camptogramma bilineata*.* *Phibalapteryx tersata*. *Cidaria testata*. *C. dotata* (= *pyraliata*). *Eubolia limitata* (= *men-suraria*). *E. bipunctaria*, a rather dark form. *Anaitis plagiata*.*

PYRALIDES.—*Aglossa pinguinalis*. *Scoparia cembræ*.* *Nomophila noctuella* (= *hybridalis*). *Pyrausta aurata* (= *punicealis*). *Herbula cespitalis*. *Endotricha flammealis*. *Scopula olivalis*.* *Botys ruralis*. *Ebulea crocealis*.* *E. verbascalis*. *E. stachydalis*.

PTEROPHORI.—*Oxyptilus hieracii* ? *Mimæseoptilus bipunctidactyla*. *Leioptilus scarodactylus*. *Acipitilia baliodactyla*.

CRAMBL.—*Crambus perlellus*. *C. tristellus*. *C. culmellus*. *Ilythyia semirubella*. *Rhodophaa tumidella*.

TORTRICES.—*Tortrix podana*. *T. cratægana*. *T. xylosteana*. *T. rosana*. *T. heparana*. *T. ribeana*. *Peronea aspersana*. *Penthina gentiana*. *P. marginana*. *H. dealbana*.* *Spilonota rosæcolana*. *Aspis udmanniana*. *Sericoris lacunana*. *Euchromia purpurana*. *Orthotænia striana*.* *Sciaphila subjectana*.* *Grapholitha penkleriana*.* *G. gemi-*

nana. *Batodes angustiorana*.* *Ephippiphora brunnichiana*.* *E. trigeminana*. *Carpocapsa grossana*.* *Dicrorampha politana*.* *D. petiverella*.* *Catoptria fulvana*. *C. citrana*. *Symathis oxyacanthella* (= *fabriciana*).* *Eupœcilia dubitana*. *E. hybridella* (= *carduana*). *Xanthosella hamana*.* *Chrosis alcella* (= *tesserana*).

TINEÆ. — *Phibalocera quercana*. *Dasycera olivierella*. *Acrolepia granitella*.

Several species of other Orders were taken, and these Mr. Billups has very kindly determined and reported on as follows:—

Coleoptera were again met with, and in some cases captured in considerable numbers; as there are some 29 species not mentioned in the June list of captures, I thought it perhaps might not be uninteresting to record the additions. They are as follows:—In the Carabidæ, *Pterostichus madidus*, F., and *Harpalus puncticollis* Pk., two specimens of each, the Staphylinidæ having a solitary specimen of *Creophilus maxillosus*, L., to represent this large family. Two specimens of *Necrophorus mortuorum*, F., and one of *vespillo*, L., with four of *Silpha thoracica*, L., and two of *S. quadripunctata*, L., represented the Silphidæ. *Epuræa æstiva*, L., in some numbers, with *E. deleta*, Er., *Meligethes æneus*, F., and *M. rufipes*, Gyll., represented the Nitidulidæ. Two specimens of *Halyzia 14-guttata*, L., were the only species met with in the Coccinellidæ. The Scarabæidæ had as types three specimens of *Onthophagus taurus*, L., and several of *Sericea brunnea*, L. The Lagriidæ had numerous representatives in its solitary genus, *L. hirta*, L., several specimens of *Anaspis pumila*, Gyll., doing duty for the Mordellidæ. In the Cerambycidæ several specimens of the fine *Rhagium mordax*, Fab., were taken, as also *Strangalia maculata*, Poda., and *Grammoptera tabacicolor*, DeG. To the Chrysomelidæ, however, the majority of species taken belong, amongst these were a solitary specimen of *Crioceris brunnea*, Fab.; several of *Timarch monticola*, Fab.; three specimens of *Chrysomela hyperici*, Forst.; one of *C. varians*, Fab.; seven of *C. tristis*, Fab.; and a number of the very beautiful *C. speciosa*, L., in nearly all shades of colour. There were also several specimens of *Lina ænea*, L., and *Gastrophysa viridula*, DeG., *Crepidodera rufipes*, L., and *C. helexines*, L., bringing up the total to 29 species. Hymenoptera had also several representatives in *Prosopis dilatata*, Kirby, and *P. communis*, Nyl.; *Andrena trimmerana*, Kirby, and *A. nitida*, Fourc.; *Anthidium manicatum*, L., and *Chelostoma florisomne*, L.; the Ichneumonidæ being represented by *Ichneumon vaginatorius*, L., and *Centeterus confector*, Gr. There were also two species of Hemiptera taken, *Piezodorus litucatus*, Fab., and *Dasycorus hirticornis*, Fab., and several specimens of Oniscidæ in *Armadillo vulgaris*, L.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

NOTODONTA DICTÆA IN AUGUST.—I found a full-fed larva of *N. dictæa*, on 8th July; it went under ground, 10th July, and emerged on 12th August. I think this is rather unusual. I also took a full-fed *Notodonta ziczac* about the same time, and it emerged two days previous to the above.—M. CRASKE; Newacott, Bridgerule, Devon, August 15, 1890.

[*N. dictæa* is perhaps not so regular as *N. ziczac* in assuming the imago condition twice during the year, but both species are double-brooded. In each case the autumn larvæ of one year produce imagines in May or June of the following year; from these are derived the larvæ, found in June and July, which attain the perfect state in August.—ED.]

BLACK VARIETY OF LIMENITIS SIBYLLA.—While collecting at Holmesley, on Friday, July 18th, I captured a fine specimen of the black variety of *Limenitis sibylla*.—R. E. JAMES; Trays Hill, Hornsey Lane, N.

PINKISH VARIETY OF ARCTIA CAIA.—I have taken in my garden (July 23) a female of *Arctia caia* with the white of the forewings deeply suffused with pink, and have another, not so deep, taken a few years ago at Portsmouth.—W. T. PEARCE; 101, Mayfield Road, Gosport.

CROCALLIS ELINGUARIA VAR. TRAPEZARIA (?).—I took from a Chester gas-lamp, on the night of August 20th, a fine specimen of *Crocallis elinguaris*, without the median transverse band on the fore wings. There is a broad pale-brown band on the hind margin of each upper wing, bordered by a narrow white line on the basal side. The discoidal and other spots are as usual, with the exception of the hind wings, which are spotless. Is this the variety *trapezaria*?—J. ARKLE; Chester. [*Trapezaria* is said to be smaller, darker, and the central fascia broader.—ED.]

ANTICLEA CUCULLATA (SINUATA) AT CHICHESTER.—I captured a fine specimen of this beautiful little Geometer, which I beat out of a hedge on 25th July. Although I do not see it mentioned by authors, I should say that the larvæ feed on other species of *Galium* besides *Galium verum*, as this plant does not grow within miles of the locality where I took this specimen. The moth is, I believe, new to the Sussex list. *Galium mollugo* grows in profusion in the hedges round about. I was much tempted to keep the moth (a female) alive for eggs, but she was in such beautiful condition, apparently having only just emerged, I thought that in all probability she must be a virgin, and so converted her into a specimen forthwith, to grace my cabinet, I trust, for many years to come.—JOSEPH ANDERSON, Jun.; Chichester.

LARENTIA OLIVATA AND EUPITHECIA SUBCILIATA AT RICKMANSWORTH.—On July 31st I took two specimens of *E. subciliata* off palings beneath a maple tree in Rickmansworth Park, and one example of *L. olivata* was disturbed from herbage growing on a bank by the road-side. There were a few commoner things on the wing; but the only insect that could be said to be plentiful was *Aphomia sociella*, which was met with on palings, and later on flying along hedgerows.—RICHARD SOUTH.

CUCULLIA ABSYNTHII NEAR BARMOUTH.—In reply to Mr. Chamberlain's note under the above heading, I shall be very curious to hear

whether he found the food-plant near Arthog; if not, I think I can solve the problem. Last year, in order to rear *absynthii*, I took up several roots from this place and planted them in my garden, on the opposite side of the estuary to Arthog, about one and a half or two miles as the crow flies. This would be nothing of a flight for *C. absynthii*. I make this suggestion, as I know of no *absynthium* growing wild in that neighbourhood.—CHAS. E. PARTRIDGE; The Castle, Portland.

NOCTUA DEPUNCTA AND TETHEA RETUSA IN DEVON.—Among common insects taken at sugar, on July 2nd, was a fine specimen of *N. depuncta*; and from a larva taken off sallow, on June 15th, I have reared *T. retusa*.—M. CRASKE; Newacott, Bridgerule, Devon, August 6, 1890.

DILOBA CÆRULEOCEPHALA ON PRUNUS LAURO-CERASUS.—In answer to Mr. W. E. Butler (Entom. 263), I have many times found larvæ of *Diloba cæruleocephala* feeding on common laurel, and have reared the imago from specimens so found.—WALDEGRAVE; 13, Montagu Place, Montagu Square.

I found, this spring, half a dozen larvæ of *Diloba cæruleocephala* on a cherry laurel. They were in their last skins, and there was nowhere near any other possible food for them. How they can eat it without setting free the poison (that of our laurel-bottles), or that they are proof against it, is equally difficult to understand. I have seen an odd Tortrix larva on laurel occasionally; I think they affect rather oldish leaves.—T. A. CHAPMAN; Hereford.

FOOD-PLANTS OF PLUSIA IOTA.—Mr. Edmonds informs me that the larva of *Plusia iota* will eat buckthorn, blackthorn, willow, sallow, poplar, birch, plantain, groundsel, dock, carrot, and walnut! I have already recorded hawthorn as a food (Entom. 204), and with these additions it would appear that the larva is polyphagous, and anything but fastidious in the matter of diet.—RICHARD SOUTH.

SIREX GIGAS IN HANTS.—I saw a fine specimen of *Sirex gigas*, on Tuesday last, the 5th inst., flying about a camp at Rushmoor, near Aldershot, but was unable to capture it, as, after a good chase, it disappeared in a pine wood, from whence it had probably come.—CHARLES MAXTED; 7, Church Terrace, Castelnau, Barnes, August 11, 1890.

SIREX GIGAS IN DURHAM.—On the 8th of August last, I noticed this insect flying about fir trees at High Force. On the 11th of the same month, Mr. R. Calvert, of Bishop Auckland, had a living specimen brought to him. This example was captured in a solicitor's office in the town, and was said to have crept from the folds of a lady's dress.—RICHARD SOUTH.

LEPIDOPTERA OF KENT: INFORMATION WANTED.—As I expect very shortly to move to Shorncliffe Camp, I should be extremely obliged for any information regarding Folkestone, Deal, Dover, or the Marshes, as far as Lepidoptera are concerned.—C. E. PARTRIDGE; The Castle, Portland.

COLLECTING ON THE NORTHUMBERLAND COAST.—Alnmouth is a small town, situated on the coast, about a mile from Bilton Junction, easily accessible from London by day or night trains, the journey occupying about eight hours. Sand-hills stretch for miles on both sides of the town; there are also some nice salt-marshes about the river-mouth. Lepidoptera were very abundant at sugar on several nights, fifty and sixty specimens on one patch of sugar being not at all unusual. The flowers of the common

rush were very attractive; so also was ragwort, which grows in rich masses. Although no important rarities were captured, some very fine varieties of common species were secured, which well repaid the trouble taken. Amongst others, the following species occurred:—*Lycana icarus*, beautifully bright vars. of female. *Cidaria immanata*; a nearly unicolorous slaty form. *Eubolia limitata* (= *mensuraria*); very dark and strongly marked. *Melanippe montanata*. *Larentia didymata*. *Leucania pallens*, *L. impura*, *L. straminea*, *L. lithargyria*. *Apamea leucostigma* (= *fibrosa*); very variable. *Miana bicoloria* (= *furuncula*); all shades of colour, from nearly white to brown. *Cerigo matura* (= *cytherea*). *Agrotis valligera*, *A. tritici*; very bright. *Triphaena comes* (= *orbona*), *T. orbona* (= *subseque*), *T. pronuba*; some nice vars. *Noctua baia*, *N. umbrosa*, *N. xanthographa*; vars. *Cleoceris viminalis*; a beautiful bright form. *Xylophasia monoglypha* (= *polyodon*); from very pale to quite black. I was only able to spend four days collecting, but I think the locality would well repay careful work.—J. H. LEECH; 29, Hyde Park Gate, S.W., August 10, 1890.

AN ADDITION TO THE LEPIDOPTERA OF SHETLAND.—Whilst spending a few days at Lerwick, in June, I captured on the shores of Bressay Island a few specimens of *Dicrorampha plumbagana*. The weather was cold and wet, and insects remarkably scarce, the only Macro I took being *E. curzoni*. I was in hopes of finding that the Diptera and Hymenoptera of the North of Scotland were darker than those from the South of England, like the Lepidoptera and Trichoptera, but such does not seem to be the case; the only fly that appears to show any variation from southern forms is *Rhagio scolopaceus*. The principal flies I saw in the Shetlands were *Pedicia rivosus*, *Tipula oleracea*, *T. lunata*, *Limnobia nigrina*, *Erioptera obscura*, *Chironomus dolens*, and *Eristalis intricarius*; *Bombus smithianus* being the only bee.—C. W. DALE; Glanvilles Wootton, August 2, 1890.

URTICATING HAIRS OF LEPIDOPTERA.—As a further contribution to the literature of this subject I may add my experience with the cocoons of *Cnethocampa processionea*. A few days since I was engaged in clearing out some cocoons of this species from a breeding-cage in which the moth had been reared some years ago. I had not long commenced my job when I felt a severe stinging about my eyes and back of the neck. To obtain relief, as I thought, I bathed my face, &c., with warm water; but this only seemed to increase the irritation. As soon as I could obtain some strong liquid ammonia from the nearest chemist, I applied this to the parts affected. The effect was very rapid, relief being experienced immediately, and I was quite free of the trouble in a short time.—H. McARTHUR; 35, Averill Street, Fulham.

THE CHESHIRE PLAGUE OF CATERPILLARS: A MYTH.—I am able to state, not merely from personal observation, but from exhaustive enquiry, that no extraordinary appearance of caterpillars has occurred in Cheshire this year. Berries—perhaps more especially gooseberries—have been generally a heavy crop; apples and pears will be much below the average; while “stone” fruit must be put down as almost a failure. A Kelsall correspondent describes the situation as follows:—“The paragraph quoted,” he writes (see ‘Entomologist’ for August, 1890, page 260), “is like many others we meet with in newspapers: some penny-a-liner imagined it! Fruit trees were damaged by frosts in May, not by cater-

pillars." Personally, I have found larvæ in Cheshire to be scarcer than for many years past. On the 15th of August I went to Delamere Forest for a few hours' beating; from oak the result was *nil*; from birch I only beat a solitary caterpillar of *Amphidasys betularia*, one of *Hylophila bicolorana*, about half a dozen *Cabera pusaria* instead of scores, and three or four more of common Geometers. This result I put down to the year's prevalence of cold and wet weather. To the same cause I attribute an extraordinary mortality among the caterpillar inhabitants of my flower-pots and breeding-cages.—J. ARKLE; Chester.

ODONTURA PUNCTATISSIMA ABUNDANT.—I never saw this Orthopteron so common as it is now in our woods.—C. W. DALE; Glanvilles Wootton, August 2, 1890.

RHIZOTROGUS SOLSTITIALIS AT CHESTER.—This beetle was very plentiful close to Chester, on the Dee banks, last July. Up to last year it was unrecorded in the list for Lancashire and Cheshire, when it was discovered in the locality just quoted. To those unacquainted with the insect it may be interesting to say that this beetle looks exactly like a small cockchafer (*Melolontha vulgaris*), a species to which it is allied.—J. ARKLE; Chester.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—August 6th, 1890.—Capt. Henry J. Elwes, F.L.S., Vice-President, in the chair. Major-General George Carden, of Surbiton, Surrey, and the Army and Navy Club, Pall Mall, S.W.; and Sir Vauncey Harpur-Crewe, Bart., of Calke Abbey, Derbyshire, were elected Fellows. Prof. Meldola exhibited a male specimen of *Polyommatus (Chrysophanus) dorilis*, Hufn., a common European and Asiatic species, which had been taken at Lee, near Ilfracombe, in August, 1887, by Mr. Latter. At the time of its capture Mr. Latter supposed the specimen to be a hybrid between *Polyommatus phlaeas* and one of the "Blues," and had only recently identified it as belonging to a well-known species. Mr. Stainton, Mr. Jenner Weir, and Colonel Swinhoe made some remarks on the specimen, and commented on the additions to the list of butterflies captured in the United Kingdom which had been made of late years. Mr. W. F. H. Blandford exhibited, and made remarks on, four specimens of *Athous rhombeus*, Ol., bred from pupæ, recently collected by himself in the New Forest. The Rev. Dr. Walker exhibited a large collection of Coleoptera which he had recently made in Iceland. The following genera, amongst others, were represented, viz.:—*Patrobus*, *Nebria*, *Byrrhus*, *Aphodius*, *Philonthus*, *Barynotus*, *Chrysomela*, *Agabus*, *Creophilus*, and *Carabus*. Mr. Champion, Dr. Sharp, and the Chairman made some remarks on the collection. Capt. Elwes exhibited three species of the genus *Atossa*, Moore, three of the genus *Elcysma*, Butl., and three of the genus *Campylotes*, West.,—all from the Himalayas and North-eastern Asia. The object of the exhibition was to illustrate the remarkable differences of venation in these closely-allied forms of the same family. Colonel Swinhoe, Mr. Warren, Mr. Moore, and others took part in the discussion which ensued. Mr. P. Crowley read a paper entitled "Descriptions of two new species of Butterflies from the West Coast of Africa," and exhibited the species, which he proposed to name respectively *Charaxes gabonica* and *Cymothoe marginata*. He also exhibited several other new

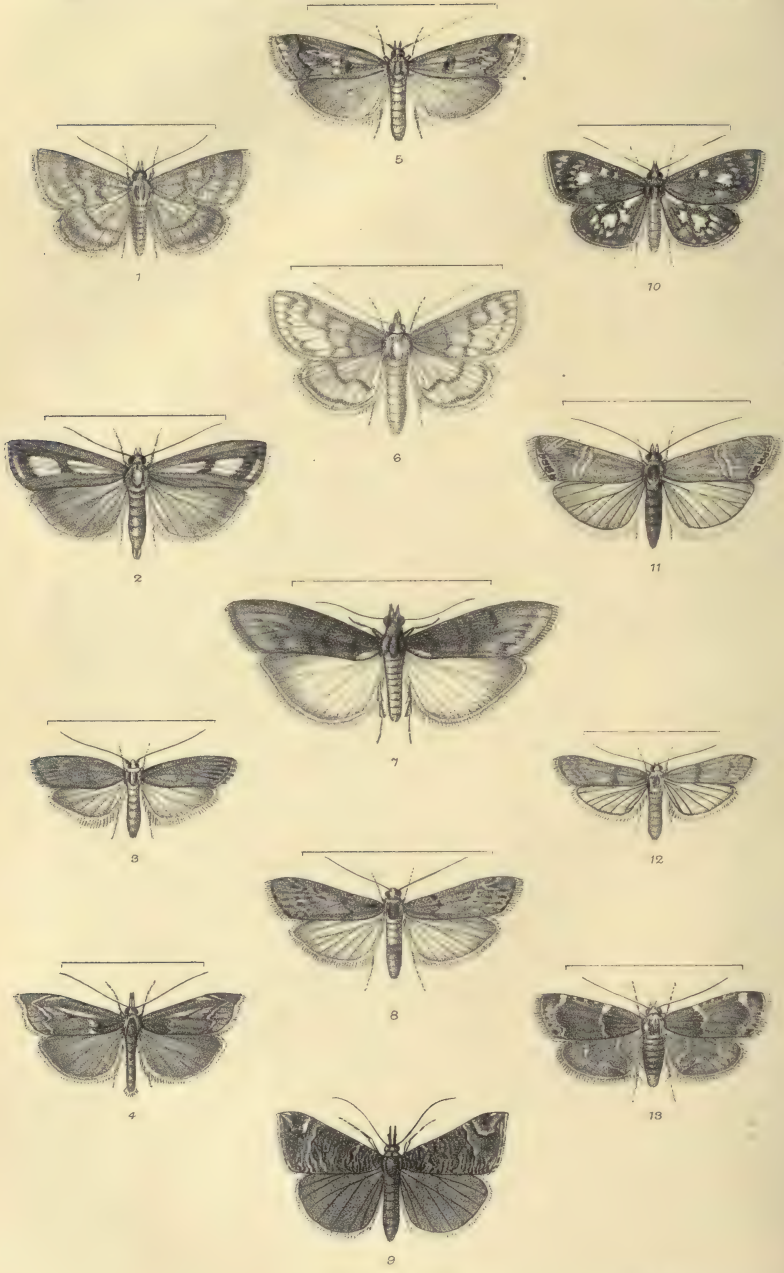
species from Sierra Leone, which had been recently described by Miss Sharp in the 'Annals & Mag. of Nat. Hist.'—H. Goss, *Hon. Sec.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.
—July 24th, 1890. J. T. Carrington, F.L.S., President, in the chair. Messrs. R. Augustine Clark, M.A., A. Hewk, and W. G. Bryant, were elected members. Mr. Turner exhibited *Noctua festiva*, Hb., from Hampstead, and a variety of the larvæ of *Biston hirtaria*, Leach, the usual brown pigment not having developed. Mr. Joy, *Collix sparsata*, Hb., from Wicken Fen, and larvæ of the same species, which he had fed on knot-grass. Mr. Wellman, a short series of *Calymnia affinis*, L., bred from larvæ taken at Chattenden; also living larvæ of *Dianthæcia nana*, Rott., *D. cucubali*, Fues., and *D. carpophaga*, Bork., from Caterham. Mr. R. Adkin, a bred series of *Moma orion*, Esp., from the New Forest. Mr. Moore, a dark variety of *Arctia caia*, L., the larvæ from which it was bred having been taken at Rotherhithe. Mr. West, *Apamea ophiogramma*, Esp., and remarked that he had found the larvæ of this species feeding in his garden at Streatham on ribbon grass. Mr. Carrington exhibited botanical specimens from Southend, Essex.

August 14th.—W. H. Tugwell, Vice-President, in the chair. Mr. H. W. Street, was elected a member. Mr. Wellman exhibited *Emmelesia unifasciata* Haw., bred from larvæ obtained at West Norwood in 1888, the species having been two years in pupa. Mr. South, *Hypsipetes sordidata*, Fb., one being strongly banded with red and having a reddish patch at the base of the primaries, bred from a larva found in Buckinghamshire; in another the same markings were reproduced in a colour almost white; the larva from which this was bred was found in Devon, and both larvæ were fed on sallow. With reference to the first example Mr. South stated that he had had some hundreds of this species through his hands, but had never met with this particular form before. Mr. South also showed an unusually dark form of *Larentia didymata*, L., from Durham, where it had been exceedingly common. Mr. R. Adkin, *Cleora glabraria*, Hb., bred, from the New Forest, and *Coccyx tadella*, Clerck., taken on the occasion of the Society's excursion to Leatherhead. Mr. Moore, two varieties of *Abraxas grossulariata*, L. Mr. Tugwell, on behalf of Mr. G. T. Porritt, larvæ of *Eupithecia extensaria*, on substituted food, *Artemisia abrotanum*. Mr. Tugwell also exhibited a box of *Arctia caia*, L., of which he stated he had bred some hundreds this season and only obtained one variety, the wings of which did not expand. Mr. Hawes, living larvæ of *Argynnis selene*, Schiff., and *A. euphrosyne*, L., which were about to hibernate. Mr. Jenner Weir, living larvæ of *Psyche villosella*, Och., and drew attention to the different kind of material from which the cases had been constructed; one singular case was formed entirely from pieces of rush, each about one quarter of an inch in length, and although he had had this specimen about two months it appeared not to have added to its case; most of the cases had been commenced with the fragments of grass and heath afterwards used. He also showed one larva from which he had removed the entire case, and had supplied it with strips of coloured paper, from which in a few days it had formed a new habitation; the coloured paper had also been used by another specimen, which had not been deprived of its case. During the last two months most of the specimens had doubled the length of their cases; the case was always made from the feeding or proximal end, and never from the distal end, from which latter the imago

emerged. In one instance, where he had made the experiment of cutting off the distal end, the larva, being unable to repair the breach, forsook the case and made another habitation. Mr. Bouttell exhibited a pale form of *Zygæna filipendulæ*, from Leigh, Essex, and *Hesperia lineola*, taken at Southend in 1882, which he had discovered in his series of *H. thaumas*. Mr. Turner, *H. lineola*, taken on the Society's excursion to Leigh, and Mr. Nussey the same species, including a very pale example from Shoe-buryness. Mr. Tugwell expressed an opinion that the species occurred on the salt marshes, and those taken on the hills were specimens that had been blown from the salt marshes. Mr. South said the species was plentiful at Tancarville, some two or three hundred yards from the River Seine, in a limestone quarry, and there was no character of salt marshes whatever; Mr. Barker said he had taken a specimen in Sussex, on the chalk. Mr. T. R. Billups, Coleoptera from Tancarville, taken by Messrs. Leech and South; a specimen of *Chrysomelida rutilans*, Woolaston, taken alive in the Borough Market, October last, and stated that the species was a native of the Canary Islands, and had probably been imported with potatoes from those Islands; *Glypta rubicunda*, Bridg., a species of Ichneumonidae new to Science, bred by Mr. Elisha from a larva of *Argyrolepis maritima*; a spider's nest from which he had bred *Hemiteles fulvipes*, Gr.—the nest was taken by Mr. R. Adkin, at Leigh, Essex; a cluster of cocoons formed by *Apanteles spurius*, Wsm., attached to a sprig of heather, and from which the living insects were emerging in some numbers; also a specimen of the white rose bedeguar gall and its maker, *Rhodites rosæ*, L., with one of its parasites, *Calimome bedeguaris*, L. Mr. Cockerell, larvæ of *Eriocampa cerasi* Pach., feeding on leaves of pear, received from Banstead, where they were doing considerable damage; hellebore was recommended as a remedy. Mr. Cockerell said the species was common in America as well as in this country. Mr. C. A. Briggs, specimens of *Cicada montana*, Scop. Mr. Perks, a specimen of *Bagous tempestivus*, Hbst., from Leigh, Essex. Mr. B. W. Adkin, a spray of oak leaves almost entirely covered with the galls of *Neuroterus fumipennis*, Hartig. Mr. Billups, *Helix incarnata*, Miller, and a white variety; *Succinea putris*, L., and the variety *linnoidea*, Bandon. Mr. Cockerell then read a list of animals and plants observed in the Leigh district, between Southend Pier and Hadley Castle, July 25th, 26th, and 27th, 1890, showing a total of 160 species and 22 varieties.—H. W. BARKER, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—*July 21st, 1890.* The President, Mr. W. G. Blatch, in the chair. Mr. W. Harrison, of Harborne, was elected a member. Mr. G. W. Wynn showed *Charocampa porcellus*, taken at Sutton Coldfield last June. Mr. G. H. Kenrick showed pupæ of *Satyrus semele*, and a larva of *Eriogaster lanestris*. Mr. R. C. Bradley showed a short series of *Sesia crabroniformis*. Rev. C. F. Thornewill showed a series of *Thecla rubi* from Cannock Chase, two specimens of which possessed a light brown spot in each of the fore wings. Mr. W. G. Blatch showed *Sesia culiciformis* from Wyre Forest. Mr. P. W. Abbott showed unusually large *Larentia cæsiata* taken on Exmoor. Messrs. E. W. Wynn and E. C. Tye gave an account of a short holiday spent collecting Lepidoptera in Wyre Forest, last June. Among other interesting species taken are *Melanippe hastata*, *Eupisteria obliterata* (= *heparata*), *Tephrosia luridata* (= *extersaria*), *Agrotis strigula* (= *porphyrea*), &c. — COLBRAN J. WAINWRIGHT, *Hon. Sec.*



West, Newman } lith.
(Horace Knight)

Deltoids Pyralides & Crambi.

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[No. 329.]

ADDITIONS TO THE BRITISH LIST OF DELTOIDS, PYRALIDES, AND CRAMBI, SINCE 1859.

By RICHARD SOUTH.

(PLATES III. & IV.)

Continued from p. 278.

CRAMBI.

CRAMBIDÆ.

CRAMBUS ALPINELLUS, Hübn. (Pl. IV. fig. 4.)

BRITISH REFERENCES:—

Crambus alpinellus, Knaggs, Ent. Mo. Mag. viii. p. 110; Ent. Ann. 1872, p. 118, pl. i. fig. 4; B. White, Scott. Nat. i. p. 135; Weston, Entom. x. p. 117; Tugwell, Entom. xiv. p. 214; Atmore, *op. cit.* xviii. p. 172; Ragonot, E. M. M. xvii. p. 15; Doubl. List, Suppl. p. 2; South, Syn. List, p. 19; Leech, Brit. Pyral. p. 73, pl. viii. fig. 2.

“Phoxopterygiform; of an ashy brown colour, with a white, longitudinal, middle streak. This streak sends out a branch towards the inner margin before the middle of the wing; beyond the middle it is intersected by an obliquely-placed mark of the ground colour; towards the apical margin there is a strongly angulated zigzag line” (Knaggs).

Introduced by Dr. Knaggs, October, 1871.

BRITISH LOCALITIES.—Southsea; Deal; Norfolk Coast.

DISTRIBUTION.—South-western France; Germany; Hungary; Livonia; Switzerland.

Note.—Zeller says that this species occurs in sandy grassy places in the pine-forests of Germany and Hungary. Ragonot mentions dry sandy pasture-lands, where broom, heath, and *Artemisia campestris* grow. In a recent communication Mr. Pearce, of Gosport, says he has been informed by Mr. H.

Moncreaff that *C. alpinellus* occurs on the shore all round Portsea and Hayling Islands. The imago flies in July and August; but the larva appears to be unknown.

CRAMBUS VERELLUS, Zinck. (Pl. III. fig. 11.)

BRIT. REF.:—

Crambus verellus, Vaughan, Ent. Mo. Mag. ix. p. 88; Knaggs, Ent. Ann. 1873, p. 42, pl. i. fig. 1; Weston, E. M. M. xi. p. 117; Entom. x. p. 118; Griffith, *op. cit.* xiv. p. 20; Ragonot, E. M. M. xvii. p. 15; Doubl. List, Suppl. p. 2; South, Syn. List. p. 19; Leech, Brit. Pyral. p. 74, pl. viii. fig. 4.

“Allied to *falsellus*, but is smaller, darker, and has rounder wings” (Knaggs).

Introduced by Mr. Howard Vaughan, September, 1872.

BRITISH LOCALITIES.—Folkestone; Cambridge.

DISTRIBUTION. — France; Germany; Sweden; Galicia; England.

Note.—The specimen taken by Mr. C. A. Briggs at Folkestone on the 21st of July, 1872, furnished the first record of this species in Britain; but, after making the announcement, Mr. Vaughan detected two other specimens, one in Mr. S. Stevens' collection, and another in that of Mr. Ramsay Cox.

M. Ragonot observes that, according to Anton Schmid, “the undescribed larva feeds in moss on the branches of old plum, apple, and poplar trees; but Dr. Rössler finds the moth also in fir-woods where the ground is covered with moss.”

CRAMBUS CONTAMINELLUS, Hübn. (= CANTIELLUS, Tutt).

BRIT. REF.:—

Crambus contaminellus (Hübn. 59), Stainton, Manual, ii. p. 183; Tugwell, Entom. xix. p. 75 (woodcuts); Tugwell & Fletcher, *l. c.* p. 163; Tutt & Fletcher, Entom. xx. p. 52; Doubl. List, p. 18; South, Syn. List, p. 20; Leech, Brit. Pyral. p. 83, pl. ix. fig. 10.

Crambus cantiellus, Tutt, Entom. xix. pp. 52 (woodcut), 73, 131.

BRITISH LOCALITIES. — Deal; Shoeburyness; Blackheath (formerly).

Note.—This is not an addition to the British list, but as the nomenclature of the species has been disturbed, it was thought advisable to include it in the present list.

CRAMBUS SALINELLUS.

BRIT. REF.:—

Crambus salinellus, Tutt, Entom. xx. p. 56.

C. contaminellus, Buckler, Ent. Mo. Mag. xv. p. 38 (larva); Porritt, Entom. xix. p. 130 (larva).

“Expanse, ♂ 8—11 lines, ♀ 9 lines to 1 in. Anterior wings

broad, costa regularly arched, apex not very acute; colour wainscot-brown, more or less dusted with black scales; in some specimens the wings are very much suffused; two transverse lines, the first starts from about the middle of the costa, curves towards the hind margin for a short distance, then runs obliquely across the wing towards the body, and meets the inner margin at about one-third from the base; the second commences on the costa nearly midway between the first line and apex, curves towards the hind margin near the upper part, forms an angle pointing towards the thorax at about two-thirds across the wing, and then curves towards the anal angle; a black streak crosses the centre of the wing, longitudinally, from the thorax to the first line, beyond which it is sometimes visible. Posterior wings pale grey in colour; in some specimens there are traces of a dark line parallel to the hind margin" (Tutt).

Introduced by Mr. Tutt, March, 1887.

BRITISH LOCALITIES. — Preston; Isle of Sheppey; Higham (Kent); Deal; Sussex Coast.

Note.—Although others appear to have been aware of it, Mr. Tutt was the first to direct our attention to the fact that we had two distinct species going under the name of *contaminellus*. Unfortunately, in his first attempt to set the matter straight, Mr. Tutt fell into error by re-naming Hübner's *contaminellus*. Subsequently, however, he had the advantage of the valuable opinions of Messrs. Tugwell and Fletcher, and, basing his conclusions on the information afforded him by those entomologists, he sunk his *cantiellus*, and gave the name of *salinellus* to the species previously confounded with *contaminellus*.

CRAMBUS MYELLUS, Hübner. (Pl. IV. fig. 3.)

BRIT. REF. :—

Crambus myellus, Saunders, Proc. Ent. Soc. Lond. 1868; Knaggs, Ent. Ann. 1869, p. 126, pl. i. fig. 3; Ragonot, Ent. Mo. Mag. xvii. p. 16; B. White, E. M. M., viii. p. 70; Scott. Nat. i. p. 143; Entom. xvi. p. 213; Warrington, E. M. M. viii. p. 113; Ellison, Entom. xviii. p. 245; E. M. M. xxv. p. 431; Baker, E. M. M. xix. p. 241; Doubl. List, Suppl. p. 2; South, Syn. List, p. 20; Leech, Brit. Pyral. p. 79, pl. ix. fig. 2.

"Fore wing acute, yellow-brown, paler at the base and inner margin. The pearly-white central streak is *twice* divided by fuscous, the third part being linear. Cilia grey, with a few white streaks. Centre of head and thorax white. Expanse 12-13 lines" (White).

Introduced by Mr. Edward Saunders in 1868 at the December meeting of the Entomological Society.

BRITISH LOCALITIES.—Aberdeen; Glen Tilt; Braemar; Rannoch.

DISTRIBUTION.—Central Europe; Finland; Armenia.

Note.—Flies in June and July, frequenting the borders of woods. The larva has been described by Treitschke, who says that it is earthy-brown, with head and plate on second segment darker brown; feeds in galleries under moss on stones in March.

EROMENE OCELLEA, Haw. (Pl. IV. fig. 11.)

BRIT. REF.:—

Palparia ocella, Haw. Lep. Brit. p. 486.

Oncocera ocella, Steph. Cat. ii. p. 217; Wood, Index, 1480.

Araxes ocella, Steph. Ill. Brit. Ent. Haust. iv. p. 316.

Crambus ocella, Stainton, Ent. Ann. 1862, p. 110.

Eromene ocella, Hearder, Ent. Mo. Mag. iii. p. 139; Gregson, Entom. iv. pp. 249 and 263; Webb, E. M. M. xvi. p. 101; Ragonot, E. M. M. xvii. p. 17; Ellis, Lep. Fauna Lanc. & Chesh. p. 76; Doubl. List, Suppl. p. 2; South, Syn. List, p. 20; Leech, Brit. Pyral. p. 87, pl. x. fig. 2.

Expanse, 1 inch. Fore wings brownish, tinged with ochreous; beyond the middle two oblique leaden lines enclose a band of the ground colour, another line of the same hue is sharply angulated below apex, and then runs parallel with outer margin; beyond this line is a series of jet-black spots with metallic centres. Hind wings fuscous grey, fringes whitish.

BRITISH LOCALITIES. — Folkestone; Dumfries; Cheshire; Glamorganshire.

DISTRIBUTION. — Central Europe; Madeira; N. W. Asia Minor; Syria; Palestine.

Note.—The specimen described by Haworth in 1812 was captured in the suburbs of London. Subsequently this example passed into Mr. Stephens' collection, where it still remains, in the insect-room of the Natural History Museum, South Kensington. For fifty years Haworth's type remained the only known British specimen of *E. ocella*, but in 1862 a second specimen was announced; four years later a third capture was recorded, a fourth in 1868, and three others in 1869. Mr. S. Webb took a specimen in August, 1879, and perhaps others may have been captured during the past twenty years, but I cannot find that they have been recorded. From the fact of some of the British specimens having been taken in February and March it has been assumed that the species hibernates, but there is only circumstantial evidence to support this view. *E. ocella* appears to be a South European and North African insect; its occurrence in England at all is probably accidental, but in any case it is difficult to understand how the imago could manage to survive the cold of a British winter. In Tangiers Mr. Leech has taken the species in February, flying at dusk on the sand-hills, but there is no reason to suppose that the species hibernates so far south.

PHYCIDÆ.

MYELOIS PRYERELLA. (Pl. III. fig. 9.)

BRIT. REF.:—

Trachonetis (?) *pryerella*, Vaughan, Ent. Mo. Mag. vii. p. 130; Knaggs, Ent. Ann. 1871, p. 90, pl. i. fig. 3; Doubl. List, Suppl. p. 2; South, Syn. List, p. 20; Leech, Brit. Pyral. p. 89, pl. x. fig. 7; Griffith, Proc. Ent. Soc. 1889 (March).
Myelois ceratoniæ var. *pryerella*, Ragonot, E. M. M. xii. p. 30.

Fore wings pale greyish white, shaded towards the base with dark grey. First line, which is undulating and oblique, passing from the inner third of the costa to the middle of the inner margin, shaded with dark grey; this shading continues in less degree to the second line. The stigmata indicated by darker grey markings. Second line denticulate, nearly parallel with hind margin; subterminal line very wavy and faintly visible on the paler ground colour. Hind margin dotted with dark grey. Cilia pale grey. Hind wings silky white, narrowly bordered with fuscous. Expanse 10 to 11½ lines.

The above is an abridgement of Mr. Vaughan's description.

Introduced by Mr. Howard Vaughan, November, 1870.

BRITISH LOCALITY.—London.

Note.—The late Mr. Eedle took a specimen of this insect in his garden near Hackney in September, 1864, and another in October of the same year, but these remained unidentified until 1870, when the late Mr. Henry Pryer captured an example in Tooley Street, August 27th, and Mr. Vaughan one on the 10th of September. M. Ragonot, after having examined "one of the original types," is of opinion that *pryerella* is only a bleached form of *ceratoniæ*. Mr. A. F. Griffith has very kindly lent me his specimens, which I have carefully examined and compared with *ceratoniæ*, and I must say that I quite concur in the opinion expressed by M. Ragonot. Of *M. ceratoniæ* but little was known until Mr. A. B. Farn met with it in a London warehouse between the years 1884 and 1887 (*vide* Ent. Mo. Mag. xiii. p. 281). Fig. 9 (Pl. III.) represents one of Mr. Griffith's specimens.

MYELOIS CIRRIGERELLA, Zinck.

BRIT. REF.:—

Myelois cirrigerella, Meyrick, Ent. Mo. Mag. xi. p. 237; Blandford, List of Marlborough Lep. p. 19; South, Syn. List, p. 20; Ragonot, E. M. M. xxii. p. 30.

"Expanse 9 lines. Palpi moderate, porrected. Head and thorax bright yellow. Fore wings glossy, rather pale brownish ochreous, yellower towards base, immaculate. Hind wings grey. Cannot be confounded with any other British species. When alive it has a very smooth and glossy appearance, and the yellow thorax is conspicuous" (Meyrick).

Introduced by Mr. E. Meyrick, March, 1875.

DISTRIBUTION. — Germany; Gallicia; Livonia; Dalmatia; England.

Note.—On the 30th of June, 1874, eight or nine specimens of

this species came to light in the neighbourhood of Marlborough, Wilts. There is no other record of the occurrence of the insect in Britain.

HOMŒOSOMA NIMBELLA, Zell., var. SAXICOLA.

BRIT. REF. :—

Homœosoma saxicola, Vaughan, Ent. Mo. Mag. vii. p. 132; White, l. c. p. 231, op. cit. viii. p. 68; Knaggs, Ent. Ann. 1871, p. 92; Gregson, Entom. v. p. 396; Doubl. List, Suppl. p. 2; South, Syn. List, p. 20; Ragonot, E. M. M. xxii. p. 26; Leech, Brit. Pyral. p. 91, pl. x. fig. 13.

“Expanse, 7—8 lines. . . . Fore wings grey, with a fuscous tint. The costal stripe bifurcates about the inner third into two other stripes of unequal size, the larger of which is continued along the costa until within a short distance of the apex, and the lesser is continued as a streak to beyond the middle of the wing. There are two or three small black dots situated about the junction of the inner and middle third, and two or three other small dots beyond the middle of the wing. . . . Hind wings shining grey; cilia paler.”—(Vaughan.)

M. Ragonot says that none of the British *nimbella* he has seen are quite like continental specimens, and adds, “*Saxicola* is generally larger; the fore wings are more distinctly white on the costa, and the rest of the wing is of a pure ochre, not at all powdered with black scales as in the type of *nimbella*. The name of *saxicola* should be retained to distinguish the English variety of *nimbella*.”

Introduced by Mr. Vaughan, November, 1870.

Note.—The earliest known examples of this insect were bred in 1867, from larvæ found in flower-heads of chamomile in the Isle of Man, September, 1866. In 1870 Dr. Buchanan White found larvæ common in the flower-seeds of several species of Compositæ, on the shores of the Solway Firth. He says that the larva, when full grown, spins a cocoon, but does not assume the pupa state until the spring. The insect has also been obtained at Clifton, Dover, and Folkestone.

HOMŒOSOMA CRETACELLA, Rössler.

BRIT. REF. :—

Homœosoma senecionis, Vaughan and Buckler, Ent. Mo. Mag. vii. p. 131; Knaggs, Ent. Ann. 1871, p. 91, pl. i. fig. 2; Porritt, Entom. xix. p. 211; Doubl. List, Suppl. p. 2; South, Syn. List, p. 20; (*H. cretacella*, Röss.), Ragonot, E. M. M. xxii. p. 26; Leech, Brit. Pyral. p. 93, pl. xi. fig. 2.

“Expanse, 8—9 lines. Fore wings: ground colour shining greyish white, the inner half being suffused with a warm fuscous tint. There are no indications of a first line. About the middle of the wing are two, and in some cases three, dark dashes. At about the junction of the middle with the outer third are two

distinct black dots. Beyond these dots is the second line, which affords a most distinctive character to the species; it is straight, and composed of black dots running in a direction oblique to the hind margin. The hind margin is more or less distinctly dotted. Cilia grey, with a faint fuscous tint. Hind wings shining grey."—(Vaughan.)

This species is closely allied to *H. nebulella*, and also to *H. binavella*; some entomologists, in fact, have considered it to be a var. of the last named. It is, however, separated from both its nearest allies by its smaller size, and may be at once distinguished by the straight, oblique, dotted submarginal line.

LARVA.—“Deep purplish brown; ventral surface slightly tinged with olive; head, and plate on second segment, deep blackish brown and brilliantly polished; the rest of the body rather shining, with a faint violet gloss.”—(Buckler, abridged.)

Introduced by Mr. Vaughan, November, 1870.

BRITISH LOCALITIES.—Stapleton; Norwich; Dover; Folkestone; Southend; Chattenden (Leech).

DISTRIBUTION.—Central and Western Germany; England.

Note.—The earliest specimens noted in this country were captured in Essex some time during the month of May, 1870. In June of the same year larvæ were found feeding in the stems of ragwort.

EPHESTIA DESUETELLA, Walk. (Pl. III. fig. 5.)

BRIT. REF.:—

Nephoteryx desuetella, Walk. Cat. Lep. Het. Suppl. p. 1719; (*Ephestia*), Meyrick, Ent. Mo. Mag. xxiv. p. 8.

Ephestia figulilella, Gregson, Entom. v. p. 385; Ragonot, E. M. M. xxii. p. 25.

Ephestia ficulella, Barrett, E. M. M. xi. p. 271; Porritt, op. cit. xvii. p. 44 (larva); South, Syn. List, p. 20; Leech, Brit. Pyral. p. 95, pl. xi. fig. 6; Ellis, Lep. Faun. Lanc. and Chesh. p. 77.

Expanse, 7—8 lines. “Fore wings very narrow at the base, strongly arched beyond the middle. Costal lappet narrow, with a tuft of long hair-like scales laid lengthwise beneath the wing. Fore wings smooth and shining, pale slate-colour, with a small ill-defined ochreous patch at the base of the dorsal margin. The first transverse line is at one-third the length of the wing from the base, pale grey, externally edged with dark grey spots, and nearly perpendicular to the margins. Second line pale grey, often obsolete, oblique, angulated above the middle, slightly edged on both sides with grey dots. Faint dashes of ochreous lie longitudinally between the wing-rays. Hind wings whitish, edged with brownish, cilia white. ♂ with one ochreous tuft at the base. Antennæ thickened beyond the basal joint, then constricted and slightly bent, and again thickened before assuming the usual

simple form. Head, antennæ, palpi, and thorax slate-grey; abdomen brown."—(Barrett.)

Mr. Porritt has described the larva as pale, pinky, flesh-coloured, with distinct pink lines; head and mandibles dark sienna-brown; frontal plate darker brown. Feeds in December on figs.

Introduced by Mr. Gregson, September, 1871.

BRITISH LOCALITIES.—London; Liverpool. In dried fruit warehouses.

Note.—Mr. Gregson first described this *Ephestia* as British under the name of *figulilella*. Four years later Mr. Barrett re-described the species, and changed the name to *ficulella*. Mr. Meyrick, however, has shown us that both names must now give way in favour of the much earlier one of *desuetella*, Walker, the type of which is from Australia. The species will probably be found wherever stocks of dried fruit are kept.

EPHESTIA CAHIRITELLA, Zell. (Pl. IV. fig. 12.)

BRIT. REF.:—

Ephestia cahiritella (Zeller, Stett. Ent. Zeit. 1867, p. 384); Ragonot, Ent. Mo. Mag. xxii. p. 24.

Ephestia passulella, Barrett, E. M. M. xi. p. 271 (1875); Buckler, E. M. M. xix. p. 104 (larva); Porritt, *op. cit.*, p. 142; South, Syn. List, p. 20; Leech, Brit. Pyral. p. 95, pl. xi. fig. 4; Ellis, Lep. Faun. Lanc. and Chesh. p. 77.

Expanse, 6—7 lines. "Fore wings narrow, especially at the base; costa less arched than in the preceding species. Costal lappet with a broad tuft of scales. Fore wings pale fuscous, with a yellowish tinge; scales large and coarse, and easily rubbed off. First transverse line at one-third the length of the wing, fuscous, ill-defined, straight, and very slightly oblique. Second line parallel with the hind margin, pale, faintly edged with fuscous, often nearly obsolete. Usual two dots on the disc oblique, fuscous, hardly discernible; cilia yellowish fuscous. Hind wings white, with scattered fuscous scales, and a faint brown margin; cilia white. ♂ with one ochreous tuft at the base. Head, antennæ, palpi, thorax, and abdomen, yellowish fuscous. Antennæ simple beyond the thick basal joint."—(Barrett.)

Introduced by Mr. Barrett, May, 1875.

BRITISH LOCALITIES.—Grocers' warehouses in London and many other towns.

DISTRIBUTION.—Cannes; Vienna; Egypt; Siberia; Japan; England; Chili.

Note.—Mr. Porritt says the species is double-brooded. He bred imagines in September and October from ova deposited by a female in the previous June. M. Ragonot observes that some of the larvæ hibernate, and change to pupæ towards the end of

May, the imago emerging in June. Mr. Hodgkinson has met with the larvæ of this *Ephestia* in a mill at Preston, where they were feeding on oil-cake.

(To be continued.)

ABUNDANCE OF LEPIDOPTERA IN NEW ZEALAND.

By W. W. SMITH.

THE study of Mr. Adkin's paper, "On the occasional abundance of certain species of Lepidoptera in the British Islands" (Entom. 177), has afforded me much pleasure, particularly as I have devoted much time for some years past to the same subject in New Zealand. The main facts adduced by Mr. Adkin to account for the occasional abundance of certain species in the British Islands will not, as I will presently explain, fully apply to the same phenomenon in New Zealand. These are what that gentleman termed "The migration and the local causes theories." The British Islands and New Zealand are both insular areas; but while the former is separated only by a few miles from the European continent, the latter is situated at least one thousand miles from the continent of Australia. Both areas are subject to an occasional abundance of certain species of Lepidoptera. On the causes of this phenomenon in New Zealand, I propose to offer some explanatory observations; whether the hypothesis I now advance to account for the great abundance of Lepidoptera during the past season will be accepted, I cannot say; it is one not at present clearly understood by naturalists; I allude to certain seasons of exceptionally luxuriant growth and floriferous display of the indigenous flora; such seasons are peculiarly favourable to the development and economy of many species of Lepidoptera, and the two last seasons in New Zealand have been of this description. Less snow fell in the higher Alps during the winters of 1888 and 1889 than for the previous twelve years, while the meteorological records show a corresponding mildness of the temperature, and a considerable diminution of north-west or snow-melting spring winds. The summers following, each have been dry and hot, and naturally adapted to the life-habits of Lepidoptera; all species I observed during the past season, from the earliest spring-appearing species to those which appeared in late autumn, emerged in great numbers, and were all beautifully-developed insects. This phenomenon was not limited to Lepidoptera, as the numbers of many species representing other orders appeared on a corresponding scale.

Mr. Adkin mentions the case of *Vanessa cardui* and *Plusia gamma* as having occurred in great numbers in the British Islands, in cold wet seasons, when other species were much less common.

The same phenomenon occurred here with the former species in 1884, but the previous season was a very floriferous one, and several species of Noctuæ appeared in unusual numbers (Entom. xxii. 37). In reviewing the various causes Mr. Adkins remarks:—"If, therefore, we are to account for the cases of occasional abundance by purely local influences, we must find some irregularity in the working of Nature." In referring to the great abundance of the same species in the past season in New Zealand, Mr. G. V. Hudson says (Entom. xxiii. 133):—"I am inclined to believe that the abundance, or the reverse, of a given species is largely determined by certain conditions of existence, with which we are at present most imperfectly acquainted, and that, in the case of a periodical insect like *V. cardui*, these conditions only recur occasionally." If the occasional abundance of this species in Britain be explained by migration from the Continent, it could only follow certain causes which favoured the great increase of the species the previous year, and no doubt identical with the causes which produce its recurrence in New Zealand at intervals of several years. The migration theory, as explained by Mr. G. V. Hudson, can have no bearing on the question in New Zealand: indeed, I have long been convinced that the great numbers of certain species which occasionally appear in New Zealand, especially among the more specialized groups, invariably follow seasons of luxuriant growth of the native flora. I would, however, mention that the economy of many species of New Zealand Lepidoptera are quite unknown at present; but when such has been fully worked out by entomologists, it will, no doubt, be discovered to be the principal cause. The same facts, of course, will apply to continental areas; but the faunas and floras of such are not so rapidly modified as in insular areas, while it clearly shows that the larva of certain species of Lepidoptera are wholly dependent on certain pabulum for their subsistence, the fuller development of which, in mild or otherwise favourable seasons, again increases, and fully explains their appearance in vast numbers in the succeeding season. The last two mild winters, and hot summers in succession, with the favourable influence on the native flora, unquestionably shows that such are likewise extremely favourable to the development of much of our Lepidopterous fauna: it has shown the same results with several introduced species belonging to other orders, which have also increased at an unprecedented rate during the last summer. Every year the indigenous flora and fauna of New Zealand are becoming more and more modified, and it is difficult—and in many cases impossible—to record faithfully the effects of such on certain species of native Lepidoptera, especially on fast-expiring forms; yet it is cheering to the naturalist to witness an occasional season fruitful to the native flora, and a consequent regeneration of many species of our ancient Lepidopterous fauna. I regret that I have no

knowledge of the effects of the snowfall, or the "fohn," in certain seasons, on the meteorological conditions or the flora of the European Alps; but the subject seems to me to require the fullest investigation, as bearing on the occasional abundance of Lepidoptera, and possibly would tend to explain the occasional abundance (by migration) of certain species in the British Islands: unmistakably these causes appear to be the chief factor, favouring the increase of certain species in the last two seasons in New Zealand. How long the renewal or increase of numbers will last remains to be observed. We are, again, almost through another mild winter, with light snowfall in the Southern Alps, the effects of which on our Lepidoptera will receive my closest attention in future.

East Belt, Ashburton, New Zealand, August 5, 1890.

NOTES ON *TÆNIOCAMPÆ OPIMA*.

By J. ARKLE.

NUMEROUS inquiries, by various correspondents, during the past two years, induce me to make the following observations upon an insect which, although clad in sober but glossy greys, I am disposed to call the Queen of the *Tæniocampæ*. My personal acquaintance with this local and beautiful moth centres exclusively in its well-known habitat at Wallasey. The egg is a miniature globe, with closely-set longitudinal lines "sculptured" from pole to pole. The little spheres are white when fresh laid, in April or May, and are clustered together on or near the tops of dead stems of ragwort, thistle, or dwarf rose. Other plants and shrubs may doubtless be included in this botanical list, but I prefer to speak from experience. I have never found the eggs on sallow, although the leaves of that plant are a favourite food in confinement. In two or three days the colour of the egg changes to brown. In a favourable season the batches are common enough, but, in the last two springs, ova of *T. opima* appear to have been comparatively scarce. On the 3rd of May—a beautifully clear and sunny morning—I went early to the sandhills for eggs wherewith to continue a most interesting study of this favourite moth. I soon found myself in good and unexpected company. Females of *Nyssia zonaria* were swinging, in the cool sea-breeze, on the long bents of the maritime grass. Their eggs were hidden away below in the junctions of bent and stem. Dozens of *Mesotype virgata* (*lineolata*), in silver-grey striped with dark brown, were resting on the short bedstraw. There were big violets about, with large white centres; beds of dwarf sallows, brilliant with yellow and odoriferous catkins; and here and

there a bloom on the burnet rose, with a scent almost equal to that of a Marechal Neil.

After a search of a couple of hours I came across two batches of *T. opima* eggs, on the top of dead ragwort. Their subsequent history is only too typical of the difficulties met with in rearing the perfect insect. I took eggs from each batch, as I have found in previous years that the moths reared from separate batches were distinctive,—that is, they were either the light-coloured type, or the dark variety figured in Newman's 'British Moths.' To still further put this experience to the test I took my eggs home, and kept them in separate tumblers (marked A and B), with the usual drop of water to prevent the shells getting too hard, gauze covering, elastic band, and square of glass. Although the ova from one batch were white when found, and those from the other brown, both sets of eggs hatched within a couple of days of each other, on the 12th and 14th of May. Six willow leaves were divided between the glasses, whereupon the larvæ, as in manner wont, marvellously and at once hid themselves.

The caterpillar, when fully grown, is a richly coloured object. The head and anal segment are reddish; second segment reddish, but darker than the head; upper surface dark purple, beautifully mottled with yellow; along each side, immediately above the legs, is a broad yellow stripe; above this, and adjoining, is a broad, very dark, purple-black stripe, and immediately above this a narrow yellow line. A line, similar to the last mentioned, runs along the middle of the back or upper surface, from head to anal segment. The under surface is pale green; the legs and claspers are green, and inclined, at the terminations, to red.

When the caterpillar answers to this description, which it will do in July, it has reached its final stage. On July 12th about twenty out of the total of forty Wallasey larvæ were full-fed, and about to pupate; the rest had died off, chiefly in the preceding stage, and in that unaccountable way so familiar to collectors who attempt to rear the insect. Worse still, the survivors were already beginning to show the first symptom of a like destiny,—*viz.*, a refusal to eat, varied by a few spasmodic bites at a leaf on being disturbed. They then began to "lose flesh," became flaccid, and died off one by one. My experience points most strongly to the low temperature and continued dampness of the past summer as the chief reasons for such a total collapse.

T. opima must have plenty of room in the larva state. There should be no more than six, or eight at the outside, on a surface of a square foot; there should be a liberal supply of fresh air and willow; the soil to pupate in should be of the lightest, with a plentiful admixture—say half the bulk—of sea- or silver-sand: and yet I fear, even with all these advantages, the breeder must be content with a very small percentage of perfect insects.

Although I have reason to believe I have been exceptionally fortunate, I never reared more than half-a-dozen at a time.

Turning over my notes, I find the emergence of the bred insect to occur between the 5th and 21st of April. There is, I think, little fear of confounding this species with *T. instabilis*. In the type insect all the wings, but especially the fore wings, are a beautiful silvery grey, with a broad, transverse, median brown bar, which is widest at the costal margin. On the widest half of this bar the discoidal spots are clearly marked out in the same silver-grey. Parallel with, and at a short distance from, the hind margin, the wing is again crossed by a rich, direct, brown line, which is exteriorly bounded by another line almost white. The fringes, especially those of the hind wings, are almost white. The antennæ of the males show a slight pectination; the thorax is a little darker in shade than the ground colour of the wings, while the body is a shade darker than the thorax. In the second form of the moth the fore wings are a rich dark brown, the hind ones being slightly paler in tint. All the markings of the fore wings, however, are clearly visible, being intensified in colour. The body and thorax are also proportionately darkened. The coloration in both forms of *T. opima* is clear, distinct, and constant, in all the specimens I have seen, whilst *T. instabilis* can lay no claim to these characteristics.

I have never captured the perfect insect. Mr. Gearley, of Wallasey, tells me he has taken both forms—freely in exceptional years—at the sallow blossom.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

BY F. H. PERRY COSTE, F.C.S.

(Continued from p. 287).

V.—THE CHEMICAL ASPECT.

B.

After the explanatory digression of last month we are now free to consider the experiments on each colour individually: and first, then, as to BLACK, that prince of absorption colours. It is very commonly told us, on excellent authority, that we learn more from our failures than from our successes: possibly—but I have some doubts thereupon; and if the sentiment be expressed by way of consolation, it is surely the consolation of a Job's comforter. Anyhow, be that as it may, I am very certain that our failures do not teach us nearly so much as the successes that we *desired* would have done. To particularise, for my own case, it must be admitted that all my endeavours to learn something of the relationship between *black* colour in Lepidoptera

and the remaining colours have totally failed, and the failure has taught us almost nothing,—and in fact left the problem somewhat more perplexed than it originally was; whereas any success in the attempt to change the black colour by chemical reagents might have taught us a good deal. Nothing observed in the course of my investigations caused me, perhaps, more surprise or disappointment than this immovability of black. As has been shown, in every case it has resisted the action of every reagent, and although I experimented on the most various species, selected from widely different families and groups of Lepidoptera, yet in not a single instance did I effect any change. Under these circumstances, then, I think it is justifiable to conclude that the black of Lepidoptera is simply a physical absorption colour, and in no way due to pigment. It seems to me quite hopeless to further examine black species of Lepidoptera; and although, in pursuing this investigation among the exotic species sent to me, I shall continue to experiment on some black species, this will be done merely on principle and as a precaution, but with very slight hope of success. For although, in one sense, it may seem very rash to argue so confidently from the results yielded by a few dozen English species, yet the unbroken uniformity of these results and the representative character of the species are, I think, sufficient justification,—especially, too, when the significance of all the other results is considered.

Now a caution is requisite here. I most certainly would not assert that, because the colour of a given species cannot be chemically altered, therefore it is a physical colour and not a chemical: it may certainly seem surprising that a pigment should resist the action of powerful chemical reagents, but among the yellows we have pretty conclusive evidence that many *do*. If the table of results in yellow be consulted it will be seen that whilst some yellows are turned completely white, others are with difficulty affected, and some are *absolutely immovable*. Now I am not at present prepared to assert that *all* of these immovable yellows are pigment colours, although I shall presently show reasons for suspecting so; but I *do* contend for it as indisputable that some are. It is, I think, impossible to deny that the yellows of *Arctia villica* and *Callimorpha hera lutescens* are pigment colours, in the face of the close relationship of these species to the red pigmented species; but these two yellows are absolutely immovable. And if stronger evidence still be asked, we have it in the fact that whereas in almost all species red is rapidly changed to yellow by the reagents, the *change stops here*,* and although we have clearly a pigment in evidence, that pigment is sensitive to a

* I stated (Entom. 158) that in no instance had I succeeded in carrying a retrogressive change further back than one stage. Since that was written I have succeeded, in at least one striking instance, in getting a *second* retrogression; details will be given in their due place.

certain extent only, and after that is absolutely unassailable. I must, however, defer the full discussion of this interesting phenomenon until we are dealing with the yellows; my object in anticipating so far here being simply to show that apparently indubitable pigment colours *may* resist the action of all the reagents, and that therefore it is not legitimate to assume any given one or two colours to be physical, and not pigment, colours, because they are chemically unaffected. Nevertheless I do think the assumption fairly legitimate in the case of black, owing to the unbroken uniformity of the results and the absence of any single contravening result.

It should be remembered how very various are the species that have been examined, and how very different the relations of black in them to the other colours. It is not as though all these species were uniformly black, or as though in all of them black were found associated with the same second colour, or occupied the same position on the wings. If *that* were the case it might justly be said that the only legitimate inference would be that *one* black of wide occurrence was immovable, and not a pigment colour; whilst other blacks might exist that were pigment colours. But the case is not so. Consider how different in character are these blacks. In *Pieris* black occurs with *white*, as spot and tips; in *Melanargia galatea* and *Arctia caia* equally distributed with white; in *Spilosoma menthastris* as small dots on white, and similarly in *Amphidasys betularia*; and as larger spots on white in *Abraxas grossulariata*. Then, in combination with *yellow*, we find it as broad tips in *Colias* and *Triphæna*, and small spots on *Venilia macularia*. With the closely allied chestnut, too, it occurs as prominent tips, blotches, or ocelli, on *Argynnis*, *Melitæa*, *Vanessa cardui*, *Pararge megæra*, *Epinephele tithonus*, *Cœnonymphe pamphilus*, *Polyommatus phlœas*. Combined with *red* we find it in *Vanessa atalanta* as apparent base or ground colour, and very glossy; as almost tarry blotches on the hind wings of *Arctia*, and as groundwork again in *Catocala*. Combined with green it occurs in *Agriopsis aprilina* and *Moma orion*, and with *grey* in *Acronycta psi*. So that here we have found it in various positions combined with all the chief colours (except *blue*); and, lastly, we have it *alone* as occupying the whole wing in *Tanagra atrata*, *Lycæna astrarche* v. *artaxerxes*, and *Epinephele hyperanthes*. But it is very remarkable that, however and wherever it occurs, it is always the same immovable black.

Now when we find any two or more pigment colours on the same species, the conclusion is almost irresistible that a genetic relationship must exist between them, if we can only discover it. If any one given colour be found in different species, combined in turn with all the other colours, a very especial interest attaches to it, since one naturally hopes to find in it a common basis by which to connect genetically all the other colours;

just such a cosmopolitan colour as this seemed *black* (as also white);* great was the interest with which I commenced working at it; and commensurately great my disappointment at the total failure. However different the reactions of its associated colours, black is always the same and unaffected—"Quod semper, quod ubique, quod ab omnibus." It is incredible to me that if black were a pigment colour it should be impervious to all my reagents—with whatever other pigment colours it be associated. I cannot believe that, in all the species just enumerated, pigments of half-a-dozen different colours should have been evolved, and in association with each a black pigment (which *must* be genetically somehow related to its companion, both being produced by the metabolic activities of the same system), always the same and always immovable. I conclude therefore, with considerable confidence, that black is no pigment colour, but a mere physical absorption result. Conformable with this is the fact that in the dozen or so instances where the black was a trifle affected, no *colour* was produced, but merely a *less black* black,—a faded, washed out, brownish black: and this is just what one might expect (if black be a physical colour) as the result of my reagent that partially destroyed the structure of the scales.† Black, then, I regard as being due—in Lepidoptera—to an arrangement of scales such as to cause a total absorption of all the incident light rays.‡ This absence of any black pigment is the more astonishing in face of its common occurrence in other orders of the animal kingdom. It would seem pretty clear that in most animals (*i. e.* Mammalia), in the normal animal as distinguished from the albino, there is a *black pigment* in the regions of the mouth, eyes, &c.§ and in the Negro there is a distribution of presumably black pigment over the whole skin surface. I am not aware how far *down* in the scale black pigments have been definitely found: possibly—it is

* In connection with this it should be pointed out that in my anticipatory theoretical reflections, before any experimental data were to hand, I had conjectured that several different blacks might exist,—so protean are its combinations. See Entom. p. 156.

† One final explanation could be hazarded. It has been suggested to me, by a friend, that in some species the colours may be enclosed in chitinous, transparent cases,—microscopic quills as it were,—and be thus rendered impervious to reagents. I am not, however, aware that this is anything more than a conjecture, and nothing in the appearance of the wings, when examined microscopically, suggests this to me. But anyhow it seems to me an utterly impossible proposition that black pigment is *always* enclosed in such chitinous receptacles, although combined with every other colour susceptible to chemical reagents, and therefore—presumably—not chitiously protected. I think we may with perfect safety ignore any such explanation as this of black's behaviour.

‡ But at the same time I am quite open to the reply that this theory, that black is no pigment colour, is only at best a probable assumption, and *not* strictly demonstrated. That is quite true; but I think it a *very* probable assumption, and at any rate we must accept it for the present as a working hypothesis.

§ *Vide* the interesting statements made by Wallace in 'Tropical Nature.' I should say, however, that Wallace does not explicitly state it to be a *black* pigment, though his expressions imply that. He merely says a "dark pigment."

a merest conjecture that may be utterly erroneous—they are found only among the higher groups of the animal kingdom, and not among the lower;* and in this connection one is tempted to adduce the fact that black flowers are almost, if not entirely, unknown. It would be somewhat interesting, therefore, to know whether or not black pigments are usually products only of a higher organisation than that of insects.

Then, again, there is another most interesting problem on which any definite *chemical* results from black might have thrown considerable light,—whereas, as it is, we are none the wiser. I refer to the phenomena of melanism. With regard to true melanism (as distinguished from melanochoism), it has been a great disappointment to me that nothing bearing upon this interesting subject has come from my work. It may be suggested that the phenomenon of melanism—*i. e.* of a black colour encroaching on and superseding other colours—is hardly to be reconciled with the supposed absence of any black pigment; whereas melanism were easily explicable if the ordinary pigments became transformed by some easily conceivable chemical change into a black pigment. But with regard to this objection I may point out that the development of melanism (in the absence of any black pigment) is no more difficult to understand (*i. e.* as a colour change—I do not speak of its ultimate cause) than the occurrence of black on *Argynnis* brown, on *Rumia* yellow, on *Pieris* white, and on *Lycæna* blue, &c. Neither is it, perhaps, even so great a difficulty as that of the black wing of *Vanessa atalanta*, which I believe to have been developed from an ancestral form closely similar to (or identical with?) *V. cardui*,† by a replacement of chestnut by black. In all such cases we must suppose that the “absorptive”—the black—scales have encroached upon the pigment-containing scales. Nevertheless, as a final caution, I must add that, since no melanic forms have come into my hands, I cannot positively state that in them also black is a non-chemical colour, and insensible to the action of reagents. I know only the conduct of ordinary normal blacks, and it is just possible that melanic forms may be due to a real pigment. For the determination of this point I must wait my opportunity; but I confess to having very little hope of finding, even in melanic forms, a black pigment.

In view of the complete unanimity of behaviour in the various black species experimented on, it seems unnecessary to animadvert on them individually, or group them according to the minor varieties of appearance or distribution of colour. As I have

* One must except, however, the sepia of the *Cuttle*. I have written the above paragraph only with considerable hesitancy, since it is purely conjectural, and may well be altogether erroneous.

† Further consideration of this topic I must defer until the brief section on the “Biological Aspect,” which it is anticipated will conclude these articles.

already pointed out, in these species worked upon, black is combined with each of the other colours in turn, and appears as ground colour, as spots, as blotches, as lines, as bands, and as tips, besides being in several instances the sole colour. As further exemplifying its chemical inaccessibility, I may especially instance the case of *Epinephela hyperanthes*. Since this species is by no means of a pure black, and is so closely allied genealogically to the very accessible chestnut-coloured species, I had entertained strong hopes that it might prove a welcome exception. But no! pure black or impure, *E. hyperanthes* is still black; and black is immovable—"Semper ubique et in omnibus!"

Erratum.—Page 286, omit footnote.

(To be continued).

THE WESTMANN ISLANDS.

By REV. F. A. WALKER, D.D., F.L.S., &c.

THE small group of islets known by this name (Vestmann-eyjar in Icelandic) is situate south of the S. coast of Iceland, between 63 and 64 deg. N. lat. and 32 and 34 deg. W. long. The names of the islets are as follows:—Drángar, Einarsdrágr, Erlendsey, Alsey, Geirfúglasker, Geldingasker, Sulusker, Hellirey, Bjarnarey, and Heimaey. By far the largest island, and the only inhabited one of the group, is Heimaey, or Home Island, distant possibly ten miles from the mainland; all the rest are rocks and skerries, or more strictly speaking, groups of rocks and skerries. These Westmann Islands derive their names from the ten Irish thralls (men of the West as opposed to Norwegians,—men of the East), who after murdering their Norwegian master, one of the earliest settlers, Hjorleifur, in his dwelling on the mainland, betook themselves, with his wife and all the women they could lay hands on, to Heimaey, and were slain in their turn, as an act of vengeance, by Ingolfur, Hjorleifur's brother, A.D. 874. In after years Algerine pirates made two descents on the islands, slew some, and carried off several into captivity, whence, after a long time, they were rescued by the king of Denmark.

It is by no means on every occasion that a steamer in passing the Westmann Islands is able to anchor off this group,—which is situate eighty miles east of the south-west point of Iceland,—in consequence of their exposed situation, high cliffs, and strong gales. Occasionally, also, it happens that a steamer, having come to anchor is, in consequence of the wind rising suddenly, obliged to continue her voyage without loss of time. Last autumn the Danish steamer from Reykjavik, being unable to make Heimaey owing to stress of weather, some ill-starred

inhabitants of that place were carried on to Seydisfjord (east coast of Iceland), where they had to remain throughout the winter and spring as well. Heimaey contains about 600 inhabitants, and its craggy promontory of Heima Klettur (Home Cliffs), surmounted by steep grassy slopes, is an island in stormy weather, as only united with the rest of the place by a low-lying neck of land covered with lava stones. Its tûn, or home-fields are divided by loose walls of lava stones, and there are boulders and crags of the same down to the water's edge, as there is scarcely any beach. *Statice armeria* flourishes profusely over the said tûn meadows and the grassy downs as well.

We arrived off the island at 4 a.m. on the 12th of June, and though feeling weak and faint, having kept my berth the whole of the previous day owing to the steamer's rolling heavily, I reflected that no entomologist had ever yet visited the Westmann Isles. It could be done, and it should be done. The additional difficulty that, owing to the heaving of the sea, the companion ladder was not lowered on this occasion now presented itself. There was no alternative but to slew one's self over the ship's side and so on to a rope ladder, which did not reach as far as the tossing boat beneath, and then drop heavily on to the flour-sacks which formed part of the cargo going ashore, and which I succeeded in reaching, after being somewhat drenched with the spray during my being rowed for about a mile through a choppy sea. The next thing was to make the best use of the short time allowed for the purpose of collecting, and my brief experience fully convinced me that Heimaey is quite as good a field for that purpose as the mainland of Iceland. My search continued for over two hours, in a spot where one has neither one's own nor the previous experience of anyone else to aid him in rapidly selecting the most suitable locality, when time is so precious. It goes without saying that Heima Klettur is whitened by the guano of innumerable sea-birds that frequent its craggy cliffs. Looking seawards from the grassy downs of Heimaey, a fine panoramic view is obtained of Eyjafjördur's sunny plateau; and the snowy peak of Hekla is also visible far inland. Heimaey's one settlement, Kaupstaðr, means the same as Copenhagen, — place of selling or merchandise. It possesses a church, and sends a representative to the Althing.

I append a list of the insects observed or captured :—

COLEOPTERA. — *Notiophilus bipustulatus*, *Nebria gyllenhali*, *Patrobis hyperboreus*, *Calathus melanocephalus* v. *nubigena*, *Platysma vitreus*, *Amara quenselii*, *Creophilus maxillosus*, *Lesteva bicolor*, *Byrrhus fasciatus*, *Aphodius lapponum*, *Otiorynchus monticola*, *O.* (? sp.), *Barynotus schonherri*, *Cryptohypnus riparius*.

DIPTERA.—*Calliphora erythrocephala*, *Scatophaga stercoraria*,

Sarcophaga mortuorum, *Heliophilus pendulus* (one specimen seen, not caught), *Tipula* (? sp.), *Musca domestica*.

HYMENOPTERA.—*Ichneumon* (1 sp. of *Lampronota*).

Dun Mallard, Cricklewood.

ALTERATION OF THE NAME OF AN INDIAN GEOMETRID MOTH.

IN part vi. of 'Ill. Typ. Lep. Het.' p. 83, I referred a moth, described by me in 1880 as "*Abraxas conspersa*," to my genus *Icterodes*. It is a white-winged species, and (owing to the then crowded state of the drawer containing the genus *Icterodes*) I was unable to transfer it to its true position in the cabinet.

In part vii. I described one of Mr. Hocking's species, with yellow wings, under the name of *Icterodes conspersa*, not seeing any species of that name under the genus. I thus duplicated the name, and, as the most careful examination reveals nothing beyond a colour distinction between the two groups of *Icterodes*, it becomes necessary to alter the name of the later species, which I propose to call *Icterodes sparsa*. I have to thank Mr. Warren for calling my attention to this stupid *lapsus calami*.

A. G. BUTLER.

Brit. Mus. Nat. Hist.

ENTOMOLOGICAL PAPERS IN CONTINENTAL PERIODICALS.

By W. WARREN, M.A., F.E.S.

COLEOPTERA.

On varieties of European Cicindelæ. H. Beuthin, Ent. Nach. 1890, iii. p. 36, v. p. 71, vi. p. 89, ix. p. 137.

Revision of the species of *Triodonta*, Muls., belonging to the Palearctic Fauna. E. Reitter, Ent. Nach. v. p. 65.

Monograph of the Pselaphidæ. A. Raffray, Revue d'Entomologie, 1890, vol. ix. pt. 1, p. 1—28; pts. 2, 3, 4, p. 29—124.

Coleoptera from the Liu-Kiu Islands. H. v. Schönfeldt, Ent. Nach., 1890, xi. p. 168.

Coleoptera occurring near Selinuntium. A. Palumbo, Sicilian Naturalist, 1890, vii. p. 166.

New Species of Coleoptera:—(a). Two new water-beetles from Abyssinia. Dr. Schaufuss, Ent. Nach. iv. p. 62. *Dineutes olivaceus*, *D. jekelii*.—(b). Two new species of Tenebrionidæ from Tripoli. G. Quedenfeldt, Ent. Nach. iv. p. 63. *Hidrosis elongatula*, *Asida nigro-opaca*.—(c). *Sternocera chrysis*, Fab., ? var. *singularis*. Kerremans, Proc. S.E. Belg. 1890, p. xix.—(d). New Histeridæ (continued). J. Schmidt, Ent. Nach. iii. p. 39, iv. p. 50.—(e). A new species of *Geotrupes* from Bosnia. V. Apfelbeck, Societas Entomologica, iv. p. 167. *Geotrupes brancsiki*.—(f). A new species of Galerucinæ

from Sumatra. A. Duvivier, Proc. S. E. Belg. 1890, p. xxxiii. *Mimastra platteeuwi*, Duviv.—Notes on Synonymy:—(i). *Haplosomoides* (n. gen.) *serena*, *Rhaphidopalpa serena*, Boh. Res. Eugen. p. 178. (ii). *Oides sexvittata*, Duviv. Bull. S. E. Belg. 1884, p. cxxxii.; *O. quinquelineata*, Jac. Ann. Mus. Civ. Gen. ser. 2, vol. iv. 1886, p. 42. (iii). *Chtoneis suturalis*, Duviv. S. E. Z. 1885, p. 243; All. Bull. S. E. Belg. 1889, p. lxxvii. (iv). *Caudezea irregularis*; *Monolepta irregularis*, Rits. Tijds. v. Ent. 1875 p. 22; *Caudezea inconstans*, Duviv. Bull. S. E. Belg. 1889, p. cxxxvii.—(g). Four new species of Hispidæ from Central America. Ant. Duvivier, l. c. p. xxxvii. *Cephaloleia ornata*, *C. balyi*, *Amplipalpa lata*, *Charistena bergi*, Buenos Ayres.—(h). Seventeen new species of the genus *Stigmodera*, Eschsch. Ch. Kerremans, Pr. S. E. Belg. 1890, p. xl., with the following corrections of species already named:—*Stigmodera parryi*, Hope, to stand for *S. fusca*, Saund.; *S. laportei*, Kerr., to stand for *S. castelnaudi*, Thoms.; *S. fraterna*, Kerr., to stand for *S. distinguenda*, Thoms.; *S. flavidula*, Kerr., to stand for *S. flava*, Thoms.

CORRODENTIA.

On the occurrence of winged as well as wingless forms of *Pyrrhocoris apterus* and other Psocidæ. Herr Loens, Ent. Nach. 1890, i. p. 10.

DIPTERA.

On Cecidomyiidæ bred from flowers of Compositæ. J. J. Kieffer, Ent. Nach. 1890, pp. 27, 36.

HYMENOPTERA.

On the preparation (killing, setting, &c.) of Hymenoptera. Dr. Kriechbaumer, Ent. Nach. 1890, i. p. 1.

Revision and tabularization of genera and species of the Cryptinæ. Dr. O. Schmiedeknecht, Ent. Nach. 1890, vi. p. 81, vii. p. 97, viii. p. 113, ix. p. 129, x. p. 145.

Description of nest and parasite of the "bull-dog" ant of Australia (*Myrmecia forficata*, Fab.). Aug. Forel, Proc. S. E. Belg. 1890, p. viii.

Revision and description of the ants of Tunis and Eastern Algeria. Aug. Forel, Proc. S. E. Belg. 1890, p. lxi.

A new species of Tenthredinidæ. Dr. R. Cobelli, Verh. Z. B. Ver. Wien. 1890, p. 159. *Macrophya bertolinii*.

LEPIDOPTERA.

On the artificial sustentation of Lepidopterous pupæ. Dr. A. Troska, Societas Entomologica, 1890, pp. 1, 9, 17, 28, 43.

Remarks on *Morpho rhetenor*, Cr., var. *helena*, Stdgr. Dr. O. Staudinger, Ent. Nach. 1890, vii. p. 107.

Notes on the differentiation of three species of *Melitæa*,—*athalia*, Rott., *parthenie*, Bork., and *aurelia*, Nick. Fritz Rühl, Soc. Entom. v. pp. 11, 44.

Food-plants and distribution of *Danaüs chrysippus* and its allies. Dr. O. Hoffmann, Soc. Entom. iv. p. 167.

Macro-Lepidoptera of Zurich and neighbourhood. Fritz Rühl, Soc. Ent. iv. pp. 169, 185, v. pp. 28, 41.

Remarkable instance of triple mimicry. F. J. M. Heylaerts, Proc. S. E. Belg. 1890, p. xii. *Perina nuda*, Fab., a Liparid; *Chalia bipars*, Wlk., a Psychid; *Kophene weyersi*, Heyl., a Psychid. These are so much alike superficially that they can only be separated after a careful examination of the nervulation. N.B.—The identification of *K. weyersi*, Heyl., with *Perina*

bipars, Wlk., by Heylaerts himself (cf. Proc. S. E. Belg. 1886, Oct.) was incorrect.

Larvæ and cases of Coleophoridæ in Silesia. C. Schmidt, Soc. Entom. iv. pp. 169, 184, v. pp. 3, 12, 19, 44.

New species:—(a). Three new species of Psychidæ from British India. F. J. M. Heylaerts, l. c. p. xi. *Chalia elwesi*, Heyl., Ganjam; *Kophene moorei*, Heyl., Bangalore; *Bijugis sikkimensis*, Heyl., Ooty.—(b). A new species of Psychid from Assam. F. J. M. Heylaerts, l. c. p. xii. *Kophene snelleni*, Heyl.—(c). Four new species of Glaucopidæ from Brazil. Heylaerts, l. c. p. xiii. *Læmocharis 5-punctata*, Heyl.; *L. nigripes*, Heyl.; *Hæmaterion dycladioides*, Heyl.; *Charidia similis*, Heyl.—(d). Three new species of Heterocera from the Dutch E. Indies. Heylaerts, l. c. p. xvi. *Syntomis claremontii*, Heyl.; *Nyctemera sumatrensis*, Heyl.; *N. tritoides*, Heyl.—(e). Six new species of Heterocera from the Dutch E. Indies. Heylaerts, l. c. p. xxvi. *Squamura* (n. gen.) *maculata*, Heyl., Sumatra; *Miresa sanguineo-maculata*, Heyl., Sumatra; *M. nigriplaga*, Heyl., Sumatra; *Thosea lutea*, Heyl., Java, Sumatra; *Arctia brunnea*, Heyl., Sumatra; *Gonitis virida*, Heyl., Java.

ORTHOPTERA.

On the species of Tettigidæ collected in West Africa by Herr Büttner. Dr. F. Karsch, Ent. Nach. 1890, p. 17. Five new species are described, with three new genera:—*Xerophyllum galeatum*, *Acrophyllum undulatum*, *Trypophyllum glabrifrons*, *Hippodes vicarius*, *Coptotettix annulipes*. Of two old species the synonymy is corrected as follows:—(1). *Phloeonotus jugatus* (*Tettix jugata*, Wlk., Cat. Derm. Salt. B. M. iv. 1870, p. 819; *Hymenotes humilis*, Gerst., Zarg. 1873, p. 47, pl. 3, fig. 7; *Phloeonotus humilis*, Boliv. Ann. S. E. Belg. 1887, p. 304, pl. 5, fig. 27; *P. natalensis*, Boliv., id.)—(2). *Pantelia horrenda* (*Cladonotus horrendus*, Wlk.; *Pantelia cristulata*, Boliv.).

On Phaneropteridæ. Dr. F. Karsch, Ent. Nach. 1890, p. 57. (1). Two new species belonging to two new genera:—*Ceratopompa festiva*, *Tetraconcha fenestrata*.—(2). *Stilpnothorax loricatus*, Pictet, = *Potamonota dregii*, Burm.

Monograph of the Proscopidæ. Dr. C. Brunner v. Wattenwyl, Verh. Z. B. Ver. Wien. 1890, p. 87, pl. 3, 4, 5.

RHYNCOTA: HEMIPTERA-HETEROPTERA.

On the Ethiopian Rhyncota in the Brussels Museum. W. L. Distant, Pr. Soc. E. Belg. 1890, p. li.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

CUCULLIA ABSYNTHII IN WALES.—In reference to Col. Partridge's suggestion as to the above (Entom. 291), I may say I found the food-plant growing commonly near Arthog; indeed, I noticed some in a hedge close to the spot where I found my insect. I have very little doubt that by watching the flowers of the honeysuckle a little before dusk the species might be taken in fair numbers in the locality.—NEVILLE CHAMBERLAIN; Highbury, Moor Green, Birmingham.

ENNYCHIA OCTOMACULATA IN NORTH WALES.—On June 20th I took several specimens of *Ennychia octomaculata* near Llanrwst. Mr. Wood says, in 'Insects at Home,' that this does not appear to be common in any part of England, but that he took four or five from one locality, Bagley Wood. I took two or three near Llanberis, but near Llanrwst I could have caught dozens without much trouble, as they appeared to be quite common in one locality.—DOUGLAS H. PEARSON; The College, Chilwell, Notts.

AMPHIDASYS BETULARIA VAR. DOUBLEDAYARIA IN NOTTINGHAMSHIRE.—I have taken this year two of the black variety of *Amphidasys betularia*, which occurs in this neighbourhood, but which I believe to be rare in the south.—DOUGLAS H. PEARSON; The College, Chilwell, Notts.

LARVÆ OF BOMBYX NEUSTRIA ABUNDANT AT STOKES BAY.—The larvæ of *Bombyx neustria* were very abundant in this neighbourhood this spring. In one hedge at Stokes Bay I counted no less than nine nests of these larvæ; and, as Southampton is not a dozen miles from here as the crow flies, it is probably the larva of this species which is referred to in Entom. xxiii. 260.—W. T. PEARCE; 101, Mayfield Road, Seafield, Gosport.

DEILEPHILA EUPHORBIE.—I am now able to give the result of the very fortunate find of my friend, which is recorded in Entom. xxiii. p. 18. Of the ten pupæ entrusted to my care, and which I subjected to the temperature of a room which had a fire daily through the winter and spring, the first emergence was that of a male on May 5th. The order of the other emergences is as follows:—May 9th, male; May 13th, male; May 31st, female; June 6th, male; June 16th, male; June 22nd, female; July 24th, female. They are all very fine and beautiful specimens. One pupa died, and one is still alive (evidently a female) which seems to be going through a second winter in this stage. I was able to pay a short visit the third week in July to the spot where the larvæ were found last autumn, but though I searched every piece of *Euphorbia paralias* most thoroughly, I failed to discover any trace whatever of larvæ, young or middle-aged.—(Rev.) J. SEYMOUR ST. JOHN; 42, Castlewood Road, Stamford Hill, N., Sept. 9.

MAMESTRA PERSICARIÆ.—I am now feeding up a number of these larvæ on ivy, upon which I found them; they eat it freely. Is not this an unusual food-plant? I have never seen it recorded in any book.—(Rev.) J. SEYMOUR ST. JOHN; 42, Castlewood Road, Stamford Hill, N., Sept. 9.

[Larvæ of *M. persicariæ* have been noticed this year feeding on ivy, poplar, lilac, plum, clematis, and raspberry; the bulk of them were some shade of brown.—ED.]

LARVÆ OF ARCTIA CAIA FEEDING ON IRIS PSEUDACORUS (YELLOW IRIS).—On June 15th I found some larvæ of *A. caia* feeding on the flowers of *I. pseudacorus*. This species is said to feed on various low-growing plants, but I cannot find the above-mentioned as one.—J. E. KNIGHTS; 14, Beaconsfield Road, North Denes, Great Yarmouth.

ACRONYCTA STRIGOSA.—I have to record the capture of a specimen of *Acronycta strigosa*, which I took at sugar near the village of Upware, in Cambridgeshire, on the 12th of July last. The insect is in fairly good condition.—HENRY A. HILL; 132, Haverstock Hill, Hampstead, N.W., Sept. 15, 1890.

HESPERIA LINEOLA.—In the report of Proceedings of the South London Natural History and Entomological Society (Entom. 296), "Mr. Tugwell expressed an opinion that this species occurred on the salt-marshes, and that those taken on the hills had been blown there." This is only a bare idea without proof. What I did say was, that I had made two excursions to Leigh for *Hesperia lineola*. My first captures there I had carefully examined, and found all to be *lineola*, and then, working on to Hadleigh, I had boxed all the *Hesperia*, thinking them to be *lineola*, but on reaching home I found 75 per cent were *thaumas*. On my second visit I commenced collecting at the same spot, and found nearly all my captures on the lower ground were *lineola*. I then met Mr. Turner, and he had been nearer the marsh than myself; he had secured some thirty specimens of *lineola*; together we worked over the ground to Hadleigh, and found *thaumas* much more common than *lineola*. We then struck out into the marshes below; there we secured a long series of *lineola*, but not a single *thaumas* amongst them. This indicates pretty clearly that its habitat was the marshes, and not the higher ground.—W. H. TUGWELL.

SIREX GIGAS IN DEVON.—On the 5th inst. I captured a specimen of the above insect, making the third I have taken here. They seem to vary considerably in size. No. 1, length to point, $1\frac{1}{2}$ in.: expanse of wings, $2\frac{1}{2}$ in. No. 2, length to point, $1\frac{1}{2}$ in.; expanse of wings, $2\frac{1}{4}$ in. No. 3, length to point, 1 in.; expanse of wings, $1\frac{1}{2}$ in. — JOHN N. STILL; Langstone, Horrabridge.

MACRO-LEPIDOPTERA IN THE NEW FOREST.—Your correspondent. Mr. E. G. Alderson, has given such a melancholy account of the Lepidoptera to be met with in the New Forest this season (Entom. 258), that I should like to record my experiences of the collecting there. I took up my quarters at Brockenhurst on the 28th of June, and stayed there until the 17th of July. The weather was not at all propitious for collecting, being stormy, with very few bright sunny days. The following were the most noteworthy Macro-Lepidoptera that I met with:—*Gonepteryx rhamni*, hibernated specimens; *Argynnis selene*, fairly numerous; *A. aglaia*, abundant in one locality; *A. adippe*, scarce; *A. paphia*, males abundant before July 17th, but females scarce even then, consequently the variety *valesina* was very rare; *Limenitis sibylla*, fairly numerous in certain localities, but very much damaged by the stormy weather,—it was very seldom one could net a perfect specimen; *Pararge egeria*, very abundant; *Satyrus semele*, a few specimens seen on July 16th; *Epinephale ianira*, very abundant, a few "bleached" forms taken; *E. hyperanthes*, abundant; *Lycæna ægon*, very abundant on certain heaths; *Syrichthus malvæ*, a few specimens noticed, but these were somewhat *passé*; *Hesperia thaumas*, abundant in certain places by about July 13th; *H. sylvanus*, very abundant; *Zygæna meliloti*, I saw several specimens, taken by the local collectors; *Z. trifolii* and *Z. filipendulæ*, both plentiful; *Calligenia miniata*, not uncommon; *Lithosia mesomella*, a few specimens taken; *Gnophria rubricollis*, I saw specimens recently taken, but did not meet with this species myself; *Emydia cribrum*, taken in large numbers by the local collectors this season; *Euchelia jacobææ*, both imagines and larvæ common; *Nemeophila russula*, common; *Arctia caia*, common; *Hepialus hectus*, common; *Bombyx quercus*, larvæ taken on heath; *Thyatira batis*, fairly common; *Moma orion*, I saw one specimen which had been taken at rest by a brother collector; *Acronycta psi*, very abundant; *Leu-*

cania turca, a few taken at sugar; *L. impudens*, a few taken on the bogs; *L. impura*, very abundant; *Xylophasia lithoxylea*, *X. hepatica*, *Dipterygia scabriuscula*, *Miana strigilis*, *M. fasciuncula*, *Grammesia trigrammica*, all at sugar, sparingly; *Acosmetia caliginosa*, taken by a local collector; *Rusina tenebrosa*, at sugar; *Agrotis strigula* (= *porphyrea*), common on the heaths; *Noctua plecta*, *N. festiva*, at sugar; *Panolis piniperda*, one larva taken, which proved to be "ichneumoned"; *Phlogophora meticulosa*, at sugar; *Aplecta nebulosa*, abundant; *Hadena dentina*, *H. thalassima*, at sugar; *H. genistæ*, one, at light; *Anarta myrtilli*, taken on the heaths,—several larvæ also taken, which subsequently proved to be ichneumoned; *Phytometra viridaria*, not uncommon; *Urapteryx sambucaria*, *Metrocampa margaritaria*, both common; *Boarmia repandata*, very abundant, some nice forms taken, including the variety *conversaria*; *B. roboraria*, not uncommon; *Pseudo-terpna pruinata*, (= *cytisaria*), not uncommon; *Phorodesma pustulata* (= *bajularia*), one specimen taken; *Acidalia immutata*, common locally; *A. emutaria*, abundant on the bogs; *Macaria liturata*, *Bupalus pinaria*, amongst the firs; *Aspilates strigillaria*, locally common on the heaths; *Hypsipetes sordidata* (= *elutata*), common; *Eubolia limitata* (= *mensuraria*), *E. plumbaria*, both abundant; *Tanagra atrata* (= *chærophyllata*), common; *Pyrausta purpuralis*, abundant; *Herbula cespitalis*, common; *Endotricha flammealis*, locally common. Certainly entomologising in the New Forest this season was disappointing work, especially at night, when "sugar" would attract but few insects; but I think the above list of species met with shows that the Forest was not, entomologically, such a desert as Mr. E. G. Alderson's letter would lead one to suppose it to have been. I may mention that I found insects at the Forest to be fully a week later than at Abbot's Wood, in Sussex, where I had just been collecting, and also considerably later than I had found them at the Forest in previous seasons.—E. W. H. BLAGG; Cheadle, Staffordshire.

A WEEK AT SHERWOOD FOREST.—On August 18th of this year, accompanied by my friend Mr. James Batty, of this town, I arrived at Edwinstowe, a small village situated close upon the Forest, and found most comfortable accommodation at 'The Royal Oak' Inn, which I can safely recommend to any entomologist visiting the locality. Every evening during our stay, with the exception of Sunday, we tried the seductive allurements of old Scotch black treacle, beer, and rum, but, except on one occasion, with very poor results. The one exception referred to was on Monday, August 25th. Directly we had put the treacle on the trees the rain commenced to pour down, and did not cease the whole night. As soon as rain began to fall my friend Batty wished to go back, as he said insects never came out in the rain; at least he had not known them to do so in forty years' experience. However, I persuaded him to accompany me just for one round, and, greatly to our surprise, we found the trees literally swarming with moths. Well, in that one round I filled about 120 boxes, all with good insects; and I think any enthusiastic entomologist would not have minded the thorough soaking that we got if the same good fortune attended. By far the commonest insect at sugar that night was *Noctua dahlia*, which swarmed on every tree. *Euperia fulvago* is a dead failure this year in its head-quarters, and I do not think we took eighteen specimens all the time we were there. Another curious thing was that we did not see even one specimen of *Amphipyra pyramidea*, which is usually an abundant species in the Forest. A few *Noctua glareosa*, in excellent

condition, were taken. One of the most amusing episodes of the wet night was that nearly all the insects on the trees were wet through, as far as their scales would allow them to be, and yet seemed quite to enjoy the bath, which was certainly more than we did; one *Triphæna fimbria* in particular, I remember, was situated just under a leaf from which the rain was dropping every second, but this seemed to be a source of pleasure to the insect rather than otherwise. Ragwort flowers also had a large share of attention. All the villagers thereabouts say that never in their memories has there been more bloom than this year; in fact it was almost too abundant. Amongst the larger patches we had no success, but the more solitary plants bordering the roads repaid us the best. Our first night was the most successful at this mode of capture, though we tried it every night, as well as the treacle, about fifty *N. dahlii*, twenty-five *Agrotis tritici*, and one *Hydræcia nictitans* (the only one seen during the visit) being the result of an hour and a half's work on this particular evening. Heather-bloom produced literally nothing either by day or night, though carefully worked; one *E. fulvago* was taken at rest at night upon it, and *Cidaria testata* was rather common flying around the bloom at dusk. One *Luperina cespitis*, one *Charæas graminis*, and a clearwing (taken by Mr. Batty, the species of which we are not quite certain about yet), all taken at ragwort in the day-time, completes a meagre list of imagines. Of course the redeeming feature was the abundance and splendid condition of *N. dahlii*, but then everything else was very scarce, except *A. tritici*. Larvæ were also a most utter failure, beating birch and oak hour after hour and day after day producing absolutely nothing; *Ephyra punctaria* and *E. pendularia*, of which one can generally get fifty of each in one day during a good season, I only took three of the former and two of the latter. *T. punctulata* was represented by about half-a-dozen larvæ. The day before we left some small, large-headed, Tortrix-like larvæ, beaten from birch, puzzled us considerably at first, but we have since found them out to be *Cymatophora duplaris*, and wished we had taken more. Ragwort produced larvæ of *Eupithecia absinthiata* and *E. centaureata* fairly commonly, but required a good deal of finding, as there was so much food to look over; the latter species was considerably the commoner. Altogether the year has been a very poor one for most insects, though some have been more than usually abundant; but it has been the larvæ more particularly that have been so conspicuous by their absence. In Mr. Batty's long and my own short entomological career we have never known such an utter absence of even the commonest of autumnal larvæ, or when beating and searching alike have been so unproductive.—A. E. HALL; Norbury, Sheffield, September 3, 1890. [If any entomologist has found larvæ in their usual numbers during the past August and September, perhaps he will be good enough to communicate a note on the subject.—ED.]

NOTES ON SUGAR.—The reports of captures at sugar during the past year or two have been so conflicting, and on the whole so discouraging, that any little information on the subject may be worth recording, and therefore the account of three evenings at sugar in this immediate neighbourhood, may not be altogether devoid of interest, especially as they appear to agree most completely with news received from other localities. On each occasion I sugared some twenty trees growing in a lane not half a mile beyond the continuous lines of bricks and mortar, of which this neighbourhood is chiefly composed, and where the hedgerows largely

consist of bramble and nettle. On July 12th the night was cool, air clear, sky overcast, and wind S.W., fresh breeze. Hardly had I got the sugar on the trees when the moths began to come to it, and continued to do so freely as each succeeding round was made. Between the trees were large patches of bramble in full blossom, but I failed to find any *Noctuæ* at them, nor was I any more fortunate at the nettles; but these were perhaps hardly sufficiently far advanced to be likely to prove attractive. July 19th, night chilly, air clear, sky cloudless, wind N.E., light breezes. Moths were decidedly common at the sugar, and continued to arrive until, having filled all my boxes, I left. Bramble was still in full bloom, and nettles fairly well well out; but although both plants were carefully searched, no *Noctuæ* were taken at them. August 6th, the day had been hot and the evening at starting was very warm and calm, a slight haze hung in the valleys and the sky was clear. While applying the sugar, an ominous chattering of the aspens foretold a coming breeze, which ultimately proved to be from the E. Not one moth visited the sugar. Nettles were now in full bloom, but produced nothing in the way of *Noctuæ*, nor were any seen on the wing; the only representative of that group observed being *Triphæna pronuba*, a solitary example in most dilapidated condition, feasting on a somewhat over-blown cluster of bramble. Reports have reached me from time to time during the summer from various localities, extending over the greater part of the kingdom, and they all agree that up to the middle of July sugar was most attractive and then suddenly became absolutely useless, and my own experience in other parts of the London district are quite in accord. Ragwort, thistles, rush, and sundry other flowers, appear to have produced some few *Noctuæ*, but the general report is that the numbers are but small,—too small indeed to explain their complete absence from the sugar; nor do the meteorological conditions appear to offer a satisfactory solution of the problem, for if the east wind and clear sky were the cause of the dearth of moths on the 6th of August, we might reasonably have expected them to exert a like influence on the 19th July.

—ROBT. ADKIN; Lewisham, Aug., 1890.

NOTES ON THE SEASON. — When I first took up the study of our Tortrices and Tineæ I am afraid that I handled the latter very roughly; this I ought not to have done with youth and good sight on my side. Now not being quite so young, my main hobby is the *Nepticulæ*, and of these I have this year set more and better than ever, both as regards pinning and setting. Now to begin an account of my doings. All my pots were left outside until April this time. I wanted to break the back of breeding before active service began, so I brought the said pots into my breeding-room, that was kept at a moderate temperature. The first insect to appear was *N. sorbiella*, from mountain ash; next came *N. hodgkinsonii*, from wild rose, ten specimens; then *Trifurcula pulverosella*, from wild apple; *N. floslactella*, from nut; *N. aucupariæ*, from mountain ash; *N. ignobilella*, from hawthorn; *N. lapponica*, from birch; *N. splendidissimella* from raspberry; *N. gei*, from dewberry; *N. malella*, from wild apple, from the highland district; this I had not met with before and mistook them for *N. desperatella*. After spending days and walking miles looking over all the old crab-trees for what I supposed to be *desperatella* (but I did not neglect the few well-known local trees), I found *desperatella*. I thought what an observer Dr. T. H. Wood was when he found larvæ of this local

species! Well, the result is that I have bred about forty specimens. They are as easy to breed as *N. tilia*, which also put in appearance in fair numbers. *B. hippocastanella*, from lime; a few *N. ruficapitella*, from oak; *N. salicis*, from the silver-leaved osier, the larva feeding nearly at the tip, quite a different way to the usual well-known *salicis* mine. Mr. Threlfall did not recognise the mine, more about this next October; one odd *N. poterii* only out of five larvæ; *N. argentipedella* and *N. betulicola*, from birch; a series of *N. plagicolella*, from sloe; only two *N. angulifasciella*; I find this bad to breed; out of twelve *N. serella* I bred about ten; they were the latest of all, if I may except *N. luteella*. Now, here is a puzzle:—In October I got some mines close to home, expecting them to be some new species. I sent mines for Dr. Wood's opinion, and he referred them to *N. lapponica*; well, I sent him the moths, having bred over a score, and said all had come out *N. luteella*. He suggested I had made a mistake, or that they were in a pot where the pupæ of *luteella* had lain over. I am pretty sure I had not, because I only put the queer *salicis* and the mines referred to in a pot separate from anything else and labelled the pot carefully. Now we will leave *Nepticulæ* and proceed to odds and ends. Only two *Coccyx scopariana* came out; I did not want any, so spent no time after the larva last July. *Penthina postrema* came out until the end of May very large and fine; a good series of this from the stems of the balsam (*C. noli-me-tangere*). By the way, I have omitted to say I bred about fifty fine specimens of *Coccyx vacciniana*, from bilberry. I met with a small patch with the leaves all stripped off; the larvæ had rolled themselves round the stem with the dead leaves. The second week in May I went two rather long journeys for *Micropteryx salopiella*, and only got four and some *M. sparmannella*. Third week in May, a very unfavourable day, a glimpse of sun now and again with a high wind, I got a dozen fine *Catoptria aspidiscana* among the golden-rod; a few of the lovely *P. lewenhoekella* were walking about on the barest place where the *Helianthemum* grows. On the sunny side, sheltered from the strong wind, I boxed about eighty mixed *Nepticula woolhopiella* and *N. argentipedella*. The tips of the birch produced several species. On a little shady bank of *Vaccinium C. vacciniana* were flying in plenty. With two nets all boxes were soon filled. My son said, "This is moth-catching made easy." He sat down, smoking his weed—"and here is another; hand me the other net." Do not think this would be so at any time,—no sun, no moths; they drop instantly, whenever the sun is obscured. By the way, when I looked in a pot in which I had put a lot of seeds from angelica, expecting that probably *T. mediana* (= *aurana*) might turn up, to my surprise there were nine *E. lucipara* out; I did not notice any larva. Now *Ecophora flavimaculella* is appearing; *Ornix anglicella* and two *Lithocolletis cavella* have turned up at my own door. On Whit Saturday I took advantage of a cheap trip to Windermere. Until the season sets in it is too dear—8s. 2d. for return, 52 miles. I have not had such a chance for years. The woods were nearly dried up. I was surprised to see such a lot of moths stirring. Geometers pretty common, in fact *C. corylata*, *M. albicillata*, and even *Eupithecia plumbeolata* was out among the *Melampyrum arvensis*; I used to take this in July. There were very few *Lithocolletis*. An odd green silver-lines (*H. prasinana*) swept into my net from time to time. The old places where I used to take *M. mansuetella* have yielded none for years. I got entangled in a rough thicket, and made for a light place about ten

yards square, where I swept a *mansuetella*; I looked round and, as usual, there the meadow-sweet grew. I cleared away some brambles for net room, and got about fifty specimens, the finest I ever saw, I put the boxes in a tin box, among the cold leaves, and got them home in fine condition. I went again on the Monday, and had the greatest trouble in finding the place. To be out of the way of painters and other workmen in the house, I went to Windermere for a month, but unfortunately left behind one of my pots containing pupæ of *Cidaria reticulata*. When I came home I found that the flower of my hopes was wrecked, for what are called "church-lice" and "wire-worms" had left nothing but a lot of wings. I was disgusted to count the remains of twenty-two specimens of the *Cidaria*. My other pot has produced ten fine large *reticulata*; one a remarkably fine variety, one-half of the fore wings (the outer half), being of a smoky amber colour; two others are partly in that direction. I must have a look over my captures, and will note them in the next article. —J. B. HODGKINSON; Ashton-on-Ribble, July 12, 1890.

A HINT TO PUPÆ-DIGGERS. — Now that the season for imagos is waning, collectors will be going forth with their trowels, and turning up the sod in search of pupæ. This turning up the sod is by no means always an easy matter, especially at such trees which are not regularly dug. To reduce this labour of digging to a minimum, let the digger provide himself with an ordinary garden trowel, and in addition to this he must procure a file; let it be round on one side, flat on the other, and finely cut. By keeping his trowel sharpened with this he will find digging done with comparative ease, less pupæ will be destroyed, and a far greater amount of work accomplished. The time taken in going from tree to tree should be utilised for the sharpening process. I strongly recommend those who have as yet neglected the use of a file, to start it at once.—J. CLARKE; 26, Carey Street, Reading, Sept. 17, 1890.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—September 3rd, 1890. Mr. Henry T. Stainton, F.R.S., in the chair. Mr. C. Fenn exhibited and remarked on specimens of *Eupithecia satyrata*, *Eudorea ambigialis*, and *Tortrix viburnana* from Darlington. Mr. H. Goss exhibited, on behalf of Mr. Martin Stanger Higgs, a remarkable variety of *Melitæa aurinia* (*artemis*), taken a few years ago, in Gloucestershire, by Mr. Joseph Merrin. The Rev. Dr. Walker communicated some observations on the Entomology of Iceland, and gave an account of his recent travels in that island. He stated that he had taken *Bombus terrestris* this year, for the first time, in the north-west of Iceland, from which quarter of the island it had not been recorded by Dr. Staudinger; he also referred to the enormous numbers of Ichneumonidæ and Diptera which he had noticed in the island. He further stated that in 1889, in the months of June and July, *Noctua conflua* was the most abundant species of Lepidoptera in Iceland; but that this year, in July and August, *Crymodes exulis* was the prevailing species, and that *Charæas graminis* and *Coremia munitata* also occurred in great numbers. In reply to a question by Mr. Stainton, Dr. Walker said that the flowers

chiefly frequented by the humble-bees were those of a small species of white galium (probably *Galium saxatile*?) and *Viola tricolor*. Dr. Walker also read "Notes on *Calathus melanocephalus* collected in Iceland, the Westmannö Isles, and the Faroe Isles in June and July, 1890." Messrs. McLachlan, Stainton, Jenner Weir, Stevens, Jacoby, Lewis, and others took part in the discussion which ensued. Mr. Arthur G. Butler communicated a paper entitled "Further Notes on the Synonymy of the genera of Noctuides."—H. Goss, *Hon. Sec.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY. —August 28th, 1890. J. T. Carrington, F.L.S., President, in the chair. Mr. C. Fenn exhibited an example of *Polyommatus phleas*, L., having the left lower wing small and pale; *Odontia dentalis*, Schiff., from amongst *Echium vulgare*; *Crambus contaminellus*, Hb.; *Grapholitha cæcana*, Schl.; and *Sphaleroptera ictericana*, Haw.—all from Deal; *Pædisca solandriana*, L., from Bexley; *Carpocapsa grossana*, Haw., from Mickleham; *C. pomonella*, L., from Lee; also a large number of *Cidaria truncata*, Hufn., bred from ova obtained from a captured female, which was exhibited. Mr. South pointed out that the parent moth was a variety, and that half the brood varied from the type in the same way. Mr. Carpenter exhibited *Pericallia syringaria*, L., bred from larvæ taken in Essex; and *Cucullia asteris*, Schiff., from Folkestone. Mr. South, local forms of Lepidoptera from the Durham district. Mr. Turner, *Myelophila cribrum*, Schiff., from Leigh, Essex. Mr. R. Adkin, *Zygana meliloti*, Esp., from the New Forest, and remarked upon the disappearance of this species from the particular locality where it was originally taken, and its discovery in another part of the Forest. Mr. Waller, living larvæ of *Acronycta leporina*, L.; and an example of *Smerinthus ocellatus*, L., which had emerged from the pupa with one antenna. Mr. Robinson, *Nonagria brevilinea*, Fenn. Mr. Joy, *Plusia festuæ*, L., larva and pupa, and remarked that this species was apparently double-brooded, as he had taken it in the latter part of August. Mr. Tutt expressed an opinion that the species was consecutively brooded in June, July, and August. Mr. Hawes, young larvæ of *Apatura iris*, L., and stated that the larva had no horns before the third skin; also *Tapinostola extrema*, Hb., from Huntingdonshire, caught in July of this year. Mr. Frohawk, a variety of *Epinephele hyperanthes*, L., with the markings lanceolate, from the New Forest. Mr. Weir mentioned that he had two of the same variety, also from the New Forest. Mr. Carrington observed that, after examining hundreds of the species in the same locality, he had only been able to find the var. *arete*, Müll. Coleoptera were exhibited by Mr. Perks, and botanical specimens were shown by Messrs. J. Jenner Weir and E. Step. Mr. Carrington made some observations on collecting Rhopalocera in the Ostend district, and a discussion arose as to the abundance or scarcity of Lepidoptera this season, in the course of which it was stated that *Lycæna corydon* had been generally scarce, and that, with a few exceptions, the season had been a bad one for Lepidoptera.

September 11th.—J. Jenner Weir, F.L.S., Vice-President, in the chair. Mr. Robertson exhibited a living larva of *Acherontia atropos*, L., from near Bognor. Mr. Oldham, a very light specimen of *Polyommatus phleas*, L.; a dark form of *Argynnis euphrosyne*, L.; also examples of many other species, including *Hesperia lineola*, Ochs., from the fens of Huntingdon. Mr. Croker, *Ditula hartmanniana*, Clerck., from the banks of the River Lea. Mr. Fenn remarked that the species occurred all round London

on the trunks of willow trees. Mr. Wellmann, *Bryophila muralis*, Forst.; *Dianthæcia albimacula*, Bork.; *Plusia festuæ*, bred from pupæ received from Cambridge; also living larvæ of *Acronycta euphorbiæ*, Fb. Mr. J. A. Cooper, dark specimens of *Bryophila perla*, Fb., from Folkestone. Mr. Carpenter, a specimen of *Argynnis paphia*, L., with the right under-wing almost colourless; a variety of *Argynnis aglaia*, L., with the spots on the under-side blending together; also a series of *Epinephele hyperanthes*, L., showing considerable variation. Mr. R. Adkin, bred specimens of *Emmelsia decolorata*, Hb., from Ireland, larger and more defined in colour than those usually taken. Mr. T. D. A. Cockerell, *Vanessa antiopa*, L., from Wet Mountain Valley, Colorado, and called attention to the irroration of the borders with black, a feature specially noticeable in American specimens of the species; also three species of *Cetonia* from Syria, viz., *Cetonia opaca*, Fb., *C. floricola* var. *ignicollis* (Dej.), Gory and Peach, and *C. impavida*, Janson. With reference to the last-named species, Mr. Cockerell stated that the specimens appeared to be specifically identical with this Indian species, as they appeared to agree in all essential points with an example in the British Museum, from Aden, named by Mr. Janson. The distribution of the species, therefore, appeared to be India, Aden, and Syria. Mr. Cockerell also exhibited two examples of *Trichodes* from Syria, one of which he stated apparently agreed with *T. syriacus*, Dej., as described in Spinola's Monograph, but was considerably larger; the other seemed to be a variety of *T. favarius*, Ill. Mr. Oldham exhibited a specimen of *Sirex gigas*, taken in the High Road at Woodford. Mr. T. R. Billups asked whether the large number of *Vespa vulgaris* had been noticed by members; when sweeping at Shirley Heath for Hymenoptera he had obtained from eight to a dozen at every sweep of the net. Mr. Rice remarked that near Ockley, within an area of 200 yards, he had counted thirty nests. Mr. South said that in 1879, which was a similar year to the present one, wasps were plentiful.—H. W. BARKER, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—August 18th, 1890.—Rev. C. F. Thornehill, V.P., in the chair. Mr. Thornehill showed a nearly black male *Argynnis aglaia* from Cannock Chase; also a specimen of *Arctia caia*, of a curious brick-red colour; also *Stilbia anomala* from Cannock Chase. Mr. E. C. Tye showed a number of Noctuæ bred from larvæ found feeding on low plants by night, at Hopwas Wood and Marston Green. Mr. R. C. Bradley showed *Brephos notha* bred from a female taken at Trench Woods; he also showed *Chrysoclysta bimaculella* from Wyre Forest. Mr. H. M. Lee showed a number of Lepidoptera from Sutton Coldfield. Mr. G. H. Kenrick read a paper on "Collecting in North Wales," in which he referred to the comparatively small number of species found there, considering the diversified character of the country and climate. He thought it might be accounted for by the great rainfall. Mr. Neville Chamberlain made a number of remarks on the Macro-Lepidoptera found by himself and Mr. Kenrick, while staying at Barmouth, from July 4th to 9th, this year. They had taken 108 species, including *Cucullia absinthii*, *Acidalia contiguaris*, &c. Mr. H. M. Lee mentioned a habit he had noticed in larvæ of *Thyatira batis*, of falling to the ground when a noise is made.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

REVIEW.

A Synonymic Catalogue of Neuroptera Odonata, or Dragonflies; with an Appendix of Fossil Species. By W. F. KIRBY, F.L.S., F.E.S., &c. 8vo, pp. ix. 202. London: Gurney & Jackson, 1, Paternoster Row. Berlin: R. Friedländer & Son. 1890.

IN the present work, Mr. Kirby has endeavoured to facilitate the study of an interesting but little known group of insects by the publication of a complete catalogue of genera and species, uniform with his 'Synonymic Catalogue of Diurnal Lepidoptera.' How much still remains to be accomplished in the Odonata may be seen from the fact that in many families almost all the work already done has been by one man, Baron De Selys-Longchamps. Except in the Libellulinae, where Mr. Kirby has arranged the genera in accordance with the revision of the subfamily which he recently published in the 'Transactions of the Zoological Society,' he has mainly followed the various synopses and monographs published by the Belgian author, except that he has occasionally revised the nomenclature, and has not adopted the Baron's somewhat cumbrous system of genera and subgenera, deeming it too complicated for the purposes of a simple catalogue.

Mr. Kirby's Preface is devoted chiefly to an exposition of the principles of nomenclature which he has adopted in the present Catalogue, and this portion of the work will probably be read with interest by many entomologists who are not neuropterists, whether they entirely agree with his views or not. The book likewise appeals to the geologist as well as to the entomologist, for the Appendix of Fossil Species occupies twelve closely printed pages, and gives full references to the rather voluminous literature relating to more than a hundred recorded species.

From the point of view of Systematic Entomology, a catalogue is only second in utility to a monograph; and whatever imperfections may afterwards be pointed out in Mr. Kirby's work, we have no doubt that it will prove of great value to all entomologists who are interested in the Odonata.

OBITUARY.

PETER MAASSEN, late of Elberfeld and Düsseldorf, died suddenly on the morning of the 2nd of August last, at Falkensteig in the Black Forest; he was in his eightieth year. Though not a voluminous writer, he was well known among lepidopterists, both by the pleasant reception he invariably gave to those who called to see his fine collection of Exotic Lepidoptera, and by his occasional visits to London and Paris. His specialty was the Saturniidae, in illustration of which family he and his friend, Gustav Weymer, issued a series of plates, under the title of 'Beiträge zur Schmetterlingskunde.' It is understood that his collection has been left to the Museum at Berlin.

Mr. C. G. HALL died on the 3rd of September, at his residence, 14, Granville Street, Buckland, Dover. As an entomologist he seems to have been attracted by each Order in turn, but the Coleoptera and Hymenoptera were his favourite groups. He was well acquainted with the literature of his subject, and his conversation was not only interesting, but showed that he was a shrewd observer of nature. There are various notes and papers from his pen in the later volumes of the 'Entomologist' and 'Entomologist's Monthly Magazine.'

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ADDITIONS TO THE BRITISH LIST OF DELTOIDS, PYRALIDES, AND CRAMBI, SINCE 1859.

By RICHARD SOUTH.

(PLATES III. & IV.)

(Concluded from p. 305.)

EPHESTIA KÜHNIELLA, Zell. (Pl. IV. fig. 2.)

BRIT. REF.:—

Myelois ceratoniæ, Thompson, Entom. xx. p. 66.

Ephestia kühniella, Barrett, Ent. Mo. Mag. xxiii. p. 255 ;
Thompson, l. c. p. 139 ; Tutt, Entom. xx. p. 212 ; Klein,
Proc. Ent. Soc. 1887, p. lii ; Adkin, Proc. S. Lond. Ent.
and Nat. Hist. Soc. 1887, p. 20, pl. i. fig. 15 ; Cockerell,
op. cit. p. 58 ; Ormerod, Rep. Injur. Ins. 1889.

Size of *ficella*, pale grey, much dusted with dark slate-grey. The first line blackish, indented, and, above the inner margin, deeply angulated, as in *Myelois ceratoniæ*. Second line deeply angulated near the costa, and indented below. Between these two lines is a black streak along the apex of the discoidal cell ; but this is not always distinct. In well-marked specimens there is an oblique, dark, central shade, from costa near apex to inner margin. There are some black dots along outer margin, and the fringes are grey. Hind wings shining white, with the venation and outer margin brown.

The foregoing description is abridged from that given by Mr. Barrett.

Larva whitish or sometimes pinkish, slightly hairy ; head reddish brown ; plates on second and anal segments yellow. Feeding in webs or silken tunnels, on flour and rice-cones.

Introduced by Mr. C. G. Barrett, April, 1887.

Note.—This species appears to have been unknown to entomologists until 1877, when Prof. Zeller received some larvæ and specimens of the perfect insect from Dr. Kühn, of Halle. Ten years afterwards, that is in 1887, *E. kühniella* was bred in this

country by Mr. Thompson, of Stoney Stratford, who found larvæ in a sack of rice-cones. These specimens were supposed to be *Myelois ceratoniæ*, and were so recorded; but some of them were sent to Mr. C. G. Barrett, who at once identified them as *kühniella*. Most of the European writers have insisted on this flour-pest being an American importation; but American entomologists deny this, and say that, although the insect may have been known in America previous to the year 1889, it was not until that year that it appeared there in any numbers. Prof. Riley, in 'Insect Life' (vol. ii., No. 6), gives a most interesting digest of the European literature on the subject, together with an account of all that was known of the species in America at the time of writing. An exhaustive life-history is given by Mr. James Fletcher in the 'Report of the Entom. Soc. of Ontario, 1889.'

EUZOPHERA OBLITELLA, Zell. (Pl. III. fig. 2.)

BRIT. REF. :—

Euzophera oblitella, Blackburn, Entom. xii. p. 16; Blackburn and Stainton, Ent. Mo. Mag. xv. p. 187; Ragonot, E. M. M. xxii. p. 31; Warren, E. M. M. xxiii. p. 233; South, Syn. List, p. 40.

"Front wings greyish, dusted with darker, both lines black, the first preceded, the second followed, by a pale band; nearly midway between the two is a conspicuous black spot. Hind wings pearly grey, gradually darkening to the hind margin."—(Blackburn.)

The above description does not quite agree with the continental example of *E. oblitella*, now figured.

Introduced by Mr. Blackburn, January, 1879.

BRITISH LOCALITY.—Isle of Wight (S. W. coast).

DISTRIBUTION.—S. W. Germany; Hungary; S. Russia; S. France; Andalusia; Sicily; Asia; N. America.

Note.—The first recorded capture of this species in Britain is that of Mr. Blackburn, who took a specimen in the autumn of 1876, on the south-west coast of the Isle of Wight. Mr. Warren, writing in 1887, says that he obtained an example of *E. oblitella*, between Yarmouth and Freshwater, "some thirteen or fourteen years since," i. e., in 1873 or 1874. M. Ragonot observes that this species has been described by Walker as *Nephopteryx propriella*, and by Clemens as *N. undulatella*. He adds that *E. oblitella* is a very variable insect, and that the larva appears to be unknown.

EPHESTIA ROXBURGHII.

BRIT. REF. :—

Ephestia roxburghii, Gregson, Entom. vi. p. 318; Ragonot, Ent. Mo. Mag. xxii. p. 25.

Expanse, 7—9 lines. "Fore wings broad, costa rounded, colour pale brownish grey, median space entirely suffused with blackish brown, in which the discal spots are hardly perceptible.

First line oblique, greyish, hardly paler than the ground colour. Second line slender, pale grey, parallel to the hind margin, slightly sinuous, followed on the costa by a dark streak. Cilia pale brownish grey, preceded by an indistinct dark line. Hind wings brownish grey, cilia paler. Head, thorax, and palpi brownish grey; antennæ pale brown, not annulated. Palpi recurved, ascending."—(Ragonot.)

Introduced by Mr. C. S. Gregson, February, 1873.

BRITISH LOCALITY.—? Liverpool.

Note.—M. Ragonot considers *E. roxburghii* to be a good species, and says that it has considerable resemblance to *Cryptoblabes bistriga*, but, apart from the different coloration, the neuration is very distinct. He adds, "*roxburghii* has not yet been bred," and this probably means that the larva is unknown, because Mr. Gregson—referring to the specimens shown to him by Mr. Roxburgh, who discovered the species—says, "They fed upon *débris* of old Lepidoptera, &c., in a neglected drawer. How the eggs came there is not known; but it is suspected they were introduced with dried fruits."

PHYCIS ADORNATELLA var. SUBORNATELLA, Dup.

BRIT. REF.:—

Phycis subornatella, Knaggs, Entom. Ann. 1867, p. 141; Barrett, Ent. Mo. Mag. xvi. p. 162, xxvi. p. 20; Richardson, *op. cit.* p. 139.

In this variety the white of the fore wings is paler, a whitish fascia precedes the first line, and the second line is less distinctly angulated.

Note.—All entomologists, whose series of *Phycis adornatella* comprised detachments from various localities, have been greatly perplexed when they attempted to determine some of the specimens comprised in such series. These examples would possess the special characters which would make them appear to be referable to *subornatella*; but, at the same time, their general characters made it apparent that they were not specifically distinct from *adornatella*. To further complicate the matter, examples would also be found which varied from the type of *adornatella* in the direction of *subornatella*, but could not be satisfactorily placed with the latter. Now that those who formerly upheld *subornatella* as a distinct species have withdrawn their support, the insect quietly falls into its proper place as a form of a very variable species, and the British entomologist will henceforth be spared considerable anxiety and much uncertainty attending the "filling up" a series of *subornatella*. It is also satisfactory to find that there is a disposition on the part of entomologists to adopt Hübner's *T. dilutella* (fig. 69) as the type of the species. Thus, after wandering about for twenty-three years, we get back to the name given in the 'Manual.'

NEPHOPTERYX SPLENDIDELLA, Herr.-Sch.

BRIT. REF. :—

Nephopteryx splendidella, Stainton, Buckler, and Wood, Ent. Mo. Mag. xxiv. p. 269.

Nephopteryx sylvestrella, Ragonot, E. M. M. xxii. p. 52.

Dioryctria splendidella, Ragonot, E. M. M. xxiv. p. 224.

Larger than *N. abietella* (= *decuriella*, Hübn.), "with a large patch of reddish brown before the first line."—(Ragonot.)

Introduced by Mr. Stainton, May, 1888.

Note.—This species has probably been in some British collections for many years past, mixed up with *N. abietella*. Mr. Stainton (*l. c.*) publishes extracts from the note-books of the late Mr. Buckler, in which (under the name of *Phycis abietella*) this larva is described, and its curious habits fully set forth. In August, 1874, Mr. Buckler received from Dr. Wood a spruce fir cone, containing a larva of *N. splendidella*, but this did not attain the imago condition. From a large larva, received on September 7th, 1877, Mr. Buckler bred a moth on June 14th, 1878. Between the years 1874 and 1879, Mr. Buckler appears to have had several infested spruce cones sent to him by Dr. Wood, but he observed that only the largest larvæ became moths, and he inclined to the view that the smaller larvæ, received late in the autumn, were not full grown, and required another year to become mature. This, however, they failed to do in confinement.

M. Ragonot says, "The larva is pinkish white, changing to greenish, without any lines; the head is reddish brown, the second segment brown-black, ordinary spots very distinct. It lives in the trunks of old firs, under the bark, causing abundant exudations of resin."

NEPHOPTERYX GENISTELLA, Dup. (Pl. IV. fig. 5.)

BRIT. REF. :—

Phycis davisellus, Newman, Entom. v. p. 445; Moore, *op. cit.* vi. p. 199; Doubleday, *op. cit.* vii. p. 112; List, Suppl. p. 2; Moncreaff, Entom. vii. p. 132 (larva); Vaughan, Proc. Ent. Soc. 1873; Blackburn, Ent. Mo. Mag. xiv. p. 159.

Pempelia albariella, Knaggs, Ent. Mo. Mag. viii. p. 163; Entom. Ann. 1872, p. 118.

Phycis (?) *davisellus*, Buckler, E. M. M. x. p. 89 (larva).

Nephopteryx genistella, Doubleday, Entom. viii. p. 41; E. M. M. xi. p. 211; South, Syn. List, p. 21; Leech, Brit. Pyral. p. 104, pl. xii. fig. 8.

Pempelia genistella, Weston, Entom. x. p. 119; Dale, E. M. M. xvi. p. 186.

"Fore wings fuscous greyish, whitish along the inner margin, especially towards the base of the wing; before the first line is a

patch, somewhat circular in shape, composed of a cluster of raised black scales; first line blackish, bordered internally with ochreous brown, angulated, starting obliquely from the junction of the basal and middle thirds of the costa; in the space between the first and second lines are three whitish streaks, the lower two being interrupted in the middle by the ground colour, so as to form four short whitish dashes; the upper extends along the discal cell, becoming slightly dilated at the disc, where a small black dot, composed of raised scales, is conspicuous; above this dot, and about midway between it and the costa, is another minute dot; the second line is blackish, irregularly sinuous, and bordered with ochreous brown towards the apical margin; towards the apex is a whitish patch. Hind wings shining fuscous grey, dusky marginal line double.”—(Abridged from description by Dr. Knaggs.)

Introduced by Mr. Newman under the name of *Phycis davisellus*, November, 1871.

BRITISH LOCALITIES.—Isle of Wight; Portsea; Isle of Purbeck.

DISTRIBUTION.—South France; Andalusia.

Note.—Mr. Moncreaff says that the eggs “are laid in July and August on young shoots of *Ulex campestris*, and as soon as the larvæ emerge they spin a thick network of silk round the branch, and under this feed until the approach of winter, when each forms for itself a close cocoon or tunnel of silk in which to hybernate. In early spring the larvæ lengthen these cases, and extend, as they increase in size, the silken web, feeding on the young buds and blossoms beneath it.”

CATEREMNA TEREURELLA, *Zinck*. (Pl. III. fig. 12.)

BRIT. REF. :—

Cateremna tereurella, Walsingham, Ent. Mo. Mag. xxiii. p. 82.

Epischnia tereurella, Barrett, E. M. M. xxv. p. 399.

Expanse, 8 lines. “Antennæ brownish fuscous. Head and palpi greyish fuscous, the base of the haustellum white. Thorax and fore wings brownish fuscous, interspersed with whitish scales, the most conspicuous marking being an oblique narrow fascia about one-third from the base of the wing, tending outwards to the dorsal margin; this fascia is angulated outwards on the fold and inwards below it. Commencing about the middle of the costa is a conspicuous white patch, which reaches half across the wing, and contains two fuscous spots, the one at its lower edge, the other immediately above it. Below this patch a few white scales are scattered across the wing towards the dorsal margin. Beyond, but separated from it by a brownish fuscous interspace, less wide than that following the first fascia, is a narrow, waved, white, transverse streak, angulated inwards below the costa, the angle pointing to the upper spot in the white patch, angulated outwards slightly above the middle, and again

inwards immediately above the anal angle. Along the apical margin is a row of six or seven brownish fuscous spots, separated by whitish scales. Fringes grey. On the under side of the fore wings a pale costal spot indicates the upper end of the white waved outer line. Hind wings shining grey. Abdomen slightly darker than the hind wings, and tuft pale ochreous."—(Walsingham.)

Introduced by Lord Walsingham, September, 1886.

BRITISH LOCALITIES.—Thetford and Lynn, Norfolk.

DISTRIBUTION.—Germany; Galicia; North-western Russia.

Lord Walsingham, in bringing forward the species (E. M. M. xxiii. p. 84), says that he bred *Cateremna terebrella* in July from cones of *Abies douglasii*, which he had collected during the same month from a tree growing on his estate. A detailed description of the larva is given in the article referred to, from which the following particulars are quoted:—"Semitransparent, greyish white, with some pale brown spots, each bearing a single hair. Head pale brown; plate on second segment slightly paler than the head."

Note.—The specimen figured was kindly lent for the purpose by Lord Walsingham.

PEMPELIA OBDUCTELLA, *Fisch.* (Pl. III. fig. 8.)

BRIT. REF. :—

Pempelia obductella, Button, Entom. v. p. 222; Meek, Ent.

Mo. Mag. vii. p. 85; Knaggs, Ent. Ann. 1871, p. 89;

Bond, Proc. Ent. Soc., November, 1870; Ragonot,

E. M. M. xxii. p. 54; South, Syn. List, p. 40.

Phycis obductella, Doubl. List, Suppl. p. 2.

Allied to species of the *Ornatella* group, "but may be readily recognized by the dark chestnut-brown anterior wings, which are only paler along the costa and on the inner margin, and by the second transverse line, which ceases far below the costa, and is broadly interrupted near the inner margin."—(Knaggs.)

Introduced by Mr. Meek, September, 1870.

BRITISH LOCALITY.—? Norfolk.

DISTRIBUTION.—Central and Southern Europe; South-eastern Russia.

Note.—In bringing forward this species as an addition to the British list, Mr. Meek says, "Several specimens have been captured by Mr. Button, of Gravesend, this season." Dr. Knaggs, referring to these same specimens, says that they were taken by Mr. Button near Gravesend. Mr. Button himself records *Pempelia obductella*, and his note reads, "Norfolk. A few among *Origanum*." According to Mr. Doubleday the larva is dull green, with longitudinal black stripes, and feeds upon various species of mint, especially *Mentha arvensis*.

EPISCHNIA BANKESIELLA. (Pl. IV. fig. 7.)

BRIT. REF. :—

Epischnia bankesiella, Richardson, Ent. Mo. Mag. xxv. p. 63 ;
Proc. Dorset Nat. Hist. Soc. x. p. 193 (col. fig.); E. M. M.
xxvi. p. 256.

“The expansion of the wings in the female is 1 inch 1 line; in the male it is slightly less. The breadth of the fore wings is almost exactly one-third of the length. The costa in the male is regularly curved; in the female it is much curved at the base and less so near the tip, whilst the intermediate portion is nearly straight. The tip is blunt, and the hind margin convex. The colour of the fore wings is light cinereous grey, clouded with dark grey, especially on the basal half of the wing. There is an inconspicuous narrow light greyish ochreous patch, extending about one-third of the way along the inner margin. The veins are streaked with dark grey. Several dark grey lines cross the wing from the costa to the inner margin; but they are all very indistinct, and only traceable with difficulty, owing to the wings being clouded with the same colour. The most distinct are two lines, one of which starts from the costa near the middle and runs towards the anal angle as far as the centre of the wing, where it turns nearly at right angles towards the base, and when at a short distance from the inner margin turns again at right angles before it reaches it. This line is double at the costa, and the two branches gradually approach each other and meet on the inner margin. The other line is one which runs from the costa near the tip, parallel to the hind margin, to a point near the anal angle, where it turns sharply outwards to the anal angle. There are slight traces of two other lines, one between the two above mentioned and one near the base; but it is difficult to follow their course, owing to the clouding of the wing. A patch of the pale ground colour, less clouded than the rest, extends obliquely from the tip to the inner margin. The fringes are of the pale ground colour, intersected by a dark grey line. The hind wings are very pale brownish grey, with a darker shade close to the margin; the fringes still paler, almost white.”

Introduced by Mr. Nelson M. Richardson, August, 1888.

Note.—Mr. and Mrs. Richardson each captured a specimen on the same evening, some time about the middle of July, 1887. They each took a specimen again in 1889; and Mrs. Richardson added one more specimen to her score this year.

The figure (Pl. IV. fig. 7) is from a very beautiful drawing by Mrs. Richardson. If anyone is desirous of seeing a coloured figure of *E. bankesiella*, he should obtain a copy of the ‘Proceedings’ of the Society referred to above.

RHODOPHÆA CONSOCIELLA var. SODALELLA, Zell.

BRIT. REF.:—

Acrobasis consociella var. *sodalella*, Barrett, Ent. Mo. Mag. xix. p. 111.

Rhodophæa consociella var. *sodalella*, South, Syn. List, p. 21.

Acrobasis sodalella, Ragonot, E. M. M. xxii. p. 26.

Sodalella differs from typical *consociella* in several respects:—

“In the larger size, equalling *suavella*; in the more richly crimson-grey central band; and in the form of the first line in the fore wings, which bounds the basal pale patch.”—(Barrett.)

Introduced by Mr. C. G. Barrett, October, 1882.

Note.—M. Ragonot is not sure that *sodalella* is a variety of *consociella*. He says there is considerable dissimilarity in the larvæ of the two insects, and adds that “until we can obtain more positive information about *sodalella*, Z., I must consider it distinct from *consociella*, Hb.”

RHODOPHÆA RUBROTIBIELLA, Fisch.

BRIT. REF.:—

Acrobasis rubrotibiella, M'Lachlan, Proc. Ent. Soc., Sept., 1858; Stainton, Ent. Ann. 1859, p. 149; Ragonot, E. M. M. xxii. p. 27.

Rhodophæa rubrotibiella, South, Syn. List, p. 21; Leech, Brit. Pyral. p. 108, pl. xii. fig. 16.

Closely allied to *A. tumidella*, but differs from it as follows:—

“1. The basal portion of the wing, instead of being orange, is a pale grey, with a red streak along the costa. 2. Instead of the broad orange band beyond the first line, there is only a slender red band. 3. The hind margin of the wing is straighter and less oblique.”—(Stainton.)

Introduced by Mr. Robert M'Lachlan, September, 1858.

Note.—Mr. M'Lachlan took two specimens in 1858, flying round an oak tree near Forest Hill. The species does not appear to be very well known by British entomologists; and, as M. Ragonot says, its synonymy is very perplexing.

MELISSOBLAPTES CEPHALONICA. (Pl. IV. fig. 3.)

BRIT. REF.:—

Melissoblaptēs cephalonica, Stainton and Knaggs, Ent. Ann. 1866, p. 147; Pryer, Ent. Mo. Mag. vii. p. 112; Barrett, *op. cit.* x. p. 272; Doubl. List, Suppl. p. 2; South, Syn. List, p. 21; Leech, Brit. Pyral. p. 110, pl. xii. fig. 5; Ragonot, E. M. M. xxii. p. 23.

Corcyra cephalonica, Ragonot, l. c. p. 58.

Exp. al., ♂, 9 lines; ♀, 9½ lines. “Head white, the frontal tuft protruding, as in *Melissoblaptēs*, and concealing the short palpi of the male; the palpi of the female are short, drooping, the second joint being densely clothed with long scales, leaving

only the extreme tip of the terminal joint visible; antennæ pale grey, the basal joint thickened and greyish white. Anterior wings with the costa somewhat rounded (in the male specimens before me these have almost the form of a flattened ellipse, though this peculiar shape is less marked in the female); grey, with the nervures darker, especially those between the end of discoidal cell and the apex of the wing; hind margin spotted with dark grey. In the male specimen the costal portion of the wing has an ochreous tinge towards the base. Cilia pale grey, with the extreme tips a little darker. Posterior wings pale grey, somewhat transparent towards the anal angle; cilia paler grey. Thorax in front whitish grey, then grey, concolorous with the anterior wings. Legs pale grey."—(Stainton.)

Introduced by Dr. Knaggs in 1866.

BRITISH LOCALITIES.—Dover; London; York.

Note.—The original specimens, described by Mr. Stainton, were bred by Mr. Hind, of York, from dried currants. Mr. Barrett, writing in 1875, says that he found the species common in grocer's fruit warehouses, on September 21st, 1874; and, as he had previously met with two examples on July 31st of the same year, he concluded that they were probably stragglers of an early brood. This species is probably now in most collections.

THE SEXES OF LEPIDOPTERA.

By T. D. A. COCKERELL.

IN Entom. xxii. 177, I referred to the dwarfing of Lepidoptera produced by insufficient food, and quoted Mr. T. G. Gentry's opinion that a preponderance of males could be produced in this way, suggesting also that those who possessed dwarfs should examine them and report on the sex.

M. Alfred Wailly (Entom. 120) took exception to this view, and stated it as his experience that any preponderance of males observed at any time among dwarfs was purely accidental, and that he had found both sexes well represented when breeding from small cocoons. He did not seem to believe that the sex of insects could be influenced in any way.

While M. Wailly's evidence as to the sexes of dwarfs is very valuable, it must still be remembered that all animals which, when adult, have the sexes separate, are at a certain stage of larval or embryonic life potentially hermaphrodite; and it really becomes a sort of choice which group of organs, male or female, shall be developed. Gynandromorphs are those in which one side has developed male peculiarities, and the other female; such are well known among Lepidoptera. A snail is a true hermaphrodite, with both sets of organs functional.

I am not able to say whether Mr. Gentry's opinion, which I quoted, has any real foundation in fact or not; but to show that the idea of nutrition affecting sex is not confined to Mr. Gentry, I will quote from a very interesting paper, by Mr. F. E. Beddard, published in the 'Report and Proceedings of the Ealing Microscopical and Natural History Society for 1889.' Mr. Beddard, referring to birds, says (p. 55):—

"It appears that in many birds the males are very much more abundant than the females. . . . M. Stoltzmann himself reports 203 males to 87 females among humming-birds, collected by him in Peru. He attempted to explain this disproportion by the apparently observed fact that the better nourished eggs become females; the worse nourished eggs, males. The female, occupied with the cares of incubation, is not in a sufficiently healthy condition to produce many well-nourished eggs. Hence the greater number of births is of male birds."

Of course there is another way of looking at it, namely, that these eggs or larvæ which were to produce females needed most nourishment, and hence when semistarvation occurred the males would be able to survive on less, and would reach the adult stage, while the females would more often die. In this way the same result, a preponderance of males, would be observed.

3, Fairfax Road, Bedford Park, Chiswick, W., Oct. 12, 1890.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

BY F. H. PERRY COSTE, F.C.S.

(Continued from p. 312).

V.—THE CHEMICAL ASPECT (*continued*).

C.

HAVING thus, for the present, disposed of black, perhaps it would be as well to say a few words upon those eminently unsatisfactory colours Brown and Grey, although the gist of my remarks thereupon is really that there is nothing to be said! So far as I can understand matters at present, these greys and non-tints so common among Noctuæ and Geometers, the brown* shades also common in Noctuæ, and even perhaps the browns of many Bombyces, already enumerated, are all (physical) absorption colours, just as black is; excepting that instead of complete absorption of the light rays taking place, only some or most of them have been absorbed.

Wallace apparently considers† that all these dubious browns,

* See, however, the remarks on pp. 221 and 223.

† 'Tropical Nature,' p. 188. I ought to add, however, that in this passage Wallace is referring to animal colours generally, and not to insects specially.

greys, *et id omne genus*, are really pigment colours; but so far as I can at present interpret them, my experiments do not seem to countenance this view. And if black be admitted as a physical and not a pigment colour, then my view derives much support from the colour phenomenon, so abundantly displayed in the *Noctuæ*, where black shades off by the most imperceptible degrees into greys, duns, and browns.

D.

Since it is evidently best that we should dispose of all the disappointing and uninteresting colours in the first place, before passing on to those which have yielded some results other than nil to the experimenter, we will now consider the case of WHITE. As already explained, I had originally anticipated (as doubtless most would have done) that white would prove a very interesting colour. Its manifest connection with yellow, as seen in so many of the *Pieridæ*, *e. g.*, naturally suggested that it might be possible, by means of reagents, to promote in the partly or wholly white species colour changes (to orange and yellow), that nature had already brought about in neighbouring species; or, in part only, in an otherwise white species. But my readers fully understand by this time how fallacious were all such hopes; and after the arguments that I have already adduced to support the view that black is no pigment colour, but merely a physical absorption effect, it is hardly necessary here to do much more than propose the view that white is equally a physical colour, but due to reflection. As with black, so again here, I can instance the complete unanimity (always excepting *galatea* and the fringes of *Lycæna*, &c.) among experiments made on the most widely-sundered species,—an unanimity the more striking since there are manifest differences in appearance between the various whites. The whites of *Pieris*, *Vanessa*, *Hepialus*, *Larentia*, and *Liparidæ*, for instance, are by no means identical in appearance.

An argument against this view (of the non-pigmental character of white) might be found in the fact that many yellows—as I have myself shown—are turned white by most of the reagents employed; and from this fact it might be argued that if yellow—an acknowledged pigment colour—is convertible chemically into white, therefore conversely white must be a pigment colour, and convertible by some other reagents (if one only knew what “some”), or at any rate by Nature, into yellow. But this argument, if advanced, were altogether futile, and for this simple reason:—the yellows, *e. g.*, of *Colias* and *Euchloë* are not *changed* into white at all, in the sense that a yellow pigment becomes white; but the yellow pigment is dissolved out of the wing, leaving this of the same pure white that the primeval *Colias* and *Euchloë*, no doubt, displayed thousands of years ago. Therefore,

in interpreting these experiments, it must not be said that yellow has been evolved *from* white, in the same sense as red has been evolved *from* yellow: this conception would be quite erroneous. Yellow, although evolved *on* or *in* a white wing, has not been evolved *from* white; that is to say, it has no genetic connection with white, as, for instance, red has with yellow. It is a necessary corollary, from this statement, that the so very usual connection of yellow and white (in the sense that probably most yellow species were formerly white) is, chemically considered, a mere accident or coincidence, and that there is no reason why yellow might not equally well have been developed on any other unpigmented* ground colour, as, for example, on a black, or grey, or brown.† Now the chestnut-coloured pigment, as I have strong reason to believe, is pretty closely related chemically to yellow, and is entirely analogous to yellow in that it also, though developed so commonly on originally white species (as is shown by the fact that reagents dissolve it out, and leave a white wing), has also no genetic relationship to white—no necessary connection therewith. In this connection, therefore, I consider it exceedingly interesting that the reactions with two chestnut species that offer apparently striking exceptions to the behaviour of the class generally, are really—according to the view just enunciated—quite normal; and in fact it is in the behaviour of these very species that we find a striking confirmation of this theory of the relations between chestnut and white, and therefore indirectly, and by analogy, of my theory concerning yellow also. But I must not further anticipate results that will be fully explained under subsequent headings.

With regard now to the absence of any white pigment, I do not think that we have here by any means so much cause for surprise as in the corresponding case of black; at least, so it seems to me now, looking at the matter in the light of past experience; but I am disappointed that my experiments should prove of no value in differentiating the various whites into different groups, and especially am I disappointed in the results of the special set of staining experiments.‡ After considering these carefully I cannot perceive that there are any particular inferences to be drawn, except that the whites of *Pieris* and *Melanargia* are somewhat different from the others—which we knew before. Now it had appeared to me (reasoning from the mere *appearance* of the different whites) that one might divide them into several groups, as, for instance:—1. *Pieris*; 2. *Melanargia*; 3. *Vanessa*, *Limenitis*, and perhaps the *Noctuæ* with white hind wings; 4. *Hepialus*; 5. Liparidæ; and so on. Such an attempt at arrangement by superficial resemblance would, how-

* The reason for this restriction of "unpigmented" is of course obvious.

† Further consideration of this is deferred until Section 6.

‡ See page 220.

ever, be most laborious, seeing how imperceptibly one white shades off into another; and hence it was that I attached so much importance to the evidence that might be obtained by means of reagents. But such evidence is not forthcoming, and my hopes must be abandoned.

Let me now draw attention to the behaviour of some few species in particular. First, as to *Pieris*. The statement made some time since in 'The Entomologist,' that the white of *Pieris* is due to reflection from air-spaces, has already been quoted. I do not know on what evidence this view was originally put forward by Dr. Dimmock, but it appears to me to be supported by the reaction with staining reagents. The effect of methyl-aniline green and violet (see Table, p. 220) was to produce an apparent *thickness* of colour, such as I saw in no other instance. The appearance of the stained wing strongly suggested to me the thought that this "thickness" was due to the stain filling up these air-spaces.*

Next as to *Melanargia galatea*. I drew special attention, in the Table, to the fact that this species had been stained by methyl-aniline violet a different colour from that produced in any other species. It is of course impossible to convey, by a mere description, the difference in appearance between this and other stained species; but I think that anyone who had *seen* the experiments would have felt as I did, that in the unique appearance of *galatea* we had additional illustration of its unique constitution,—its difference from other white species. But with regard to the yellow produced by various reagents in this species, no doubt it will be asked what explanation, if any, can be offered of this exceptional and anomalous behaviour of *galatea*: why should it react in a manner so contradictory and opposed to all that one might expect,—judging from the other experiments? Well, after studying the question, I conclude that the anomaly and exception—striking though they seem—are apparent only, and not real; that if the views laid down in foregoing paragraphs be assented to, there is here no real difficulty at all. Nay, more, the reactions of *galatea* may be interpreted as lending additional support to my theory; and, in fact, I am confirmed in my views by the independent support that they derive from this behaviour of *galatea*, since I was originally led to such conclusions without any reference to the phenomenon now in question. If, however, my views be entirely wrong,—if there be a white pigment which gradually developed into yellow or chestnut,—if the destruction of yellow and chestnut by reagents be due not to a solution of the pigments,

* In this connection I might add that the white of some species of flowers is certainly due to this cause. If pressure be applied the air-spaces are broken, the white disappears, and a colour appears, due to a pigment present in slight quantity, whose effect was apparently veiled before.

but to a retrogressive modification of yellow or chestnut into white pigment,—then I admit that in *Melanargia galatea* we have a glaring difficulty. But, granting my theory, the difficulty is apparent only.

Let me explain this. It is admitted pretty generally that the pigments of animals, and of flowers also,* are, physiologically considered, waste products. At any rate it can hardly be doubted that they are decomposition products, due to the breaking down of a large and complex molecule into several less complex. In vegetable physiology it seems pretty well established that the most various substances—as starch, mucilage, tannin, resin, gum, oil,† &c.—are all formed by a decomposition of the protoplasm that is incessantly going on; and it is only in accord with all analogy and observation to expect that the chlorophyll (or rather its forerunner etiolin, or perhaps a mother-substance of this) is either a direct decomposition product of the protoplasmic molecule,‡ or a simple compound of such decomposition product with another body found in the cell; and the various plant pigments—or at least many of them—are closely related to chlorophyll. Similarly, in animals, it is very probable that such pigments as bilirubin, urobilin, lutein, &c., are derivatives of hæmoglobin, which is no doubt a decomposition (katabolic) product of the protoplasm.§ I have quoted the above facts to show that I am only assuming that there holds good for insect pigments what is an universal phenomenon of physiology; and now I can state very simply what seems to me the explanation of the reaction with *galatea*. I take it that in this species the metabolic processes have not yet produced any pigment, but *very nearly so*; that there exists in the wing a very unstable *mother-substance* (itself a decomposition product, whether produced immediately from the protoplasmic molecule, or mediately from a molecule of intermediate complexity); and that the action of any powerful reagent is to decompose this into a yellow pigment, and something else that does not concern us at present. This view, although at present necessarily somewhat hypothetical,|| offers a satisfactory explanation of the apparent anomaly in *galatea*.¶ One objection may

* “The colouring matters of plants may be regarded simply as waste products in so far as their direct use in constructive metabolism is concerned.”—(Vines’ ‘Physiology of Plants,’ p. 242.)

† Cf., e.g., Vines’ ‘Physiology of Plants,’ *passim*; &c.

‡ Vines’ ‘Physiology,’ p. 241. Also Dr. Schunck, on the “Chemistry of Chlorophyll,” in ‘Annals of Botany’ vol. iii.; and of an abstract in the Microscopic Society’s journal for this year, pp. 196, 197.

§ Cf. Michael Foster’s ‘Text-Book of Physiology,’ *passim*.

|| I hope before long to have an opportunity of examining these various pigments by a method sufficiently obvious, which I hope may give us a far clearer insight into their constitution and affinities.

¶ It is of course an essential corollary from this that *galatea* may be expected *one day* to become yellow,—by perfecting its decomposition processes! As a matter of fact I may point out that already (in the *female*) the presence of the “mother-substance” of the pigment has produced a slight yellowish-cream tinge.

still be raised, *viz.*, that, granting the above, yet the yellow pigment, as soon as produced, ought to be dissolved by the reagents employed, leaving the wing finally colourless, as in *Euchloë* or *Colibas*, for example. To which I reply that, in the first instance, *not all* yellows are dissolved; and, in the second, that on repeating my experiments with special reference to this point, I find that in every case the reagent which produces the colour also dissolves it (a fact observed from the first as true of some reagents), leaving a colourless transparent wing. So that we may fairly consider *galatea* to offer no contravention to the general rule.

The next species to which I will call attention is *Amphidasys betularia*. Knowing that buff-coloured varieties of this species occur, I was exceedingly interested to learn how reagents would affect this white. Most of them were absolutely without effect (as usual), but after treatment with sulphuric acid there were one or two *very* small but distinct buff spots or marks on the wing. The same effect was produced by potassic permanganate, and somewhat doubtfully by tannin and by gallic acid. This was rather exciting; and, in the hope of transforming the white entirely, I specially experimented by submitting wings of this species to the action of sulphuric acid for an entire week. To my great disappointment, however, at the expiration of that period, the white was really not affected at all, except that the veins were buff. Had the experiment succeeded we should have had a companion case to that of *galatea*; but as it is I am somewhat a loss to understand why such a very trifling effect was produced, and nothing more. It is, however, very possible that this species is in an analogous condition to *galatea*, but that the "mother-substance" of a pigment is in most specimens less far advanced in the metabolic progress. I should dearly like to test (if there be such) a *white* specimen bred from one normal and one buff parent, — since one might expect that in this instance a pigment could be readily produced by the same method as in *galatea*. If so, one might next experiment on a "quadroon" specimen, and so on.

Of the remaining species there is very little to be said. The peculiar behaviour of *Hepialus humuli* may be pointed out. I cannot understand why this white, which presents such a fine, almost polished, appearance, should "go transparent" under the action of most reagents. But this is a puzzling and unsatisfactory species altogether. The natural quasi-transparency of the white in *Vanessa*, *Limenitis*, and many *Noctuæ* and *Geometræ*, was even more evident under the influence of various reagents; and with this may, *perhaps*, be correlated the fact that they stained so very slightly (see p. 220).

With this, I think, concludes all that need at present be said about *white*, and we may now pass to the consideration of some pigment colours.

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

PLUSIA MONETA IN BRITAIN.—It may be worth recording that on 1st July last I captured at light, in a wood near here, a very fine specimen of *Plusia moneta*. Messrs. Watkins and Doncaster identified it. I also took a specimen of *Acronycta alni* in June, at sugar.—R. A. DALLAS BEECHING; 24, St. James' Road, Tunbridge Wells, October 2, 1890.

[Mr. C. G. Barrett, in the October number of *another magazine*, to wit the 'Entomologist's Monthly,' has a most interesting note on the occurrence of this species in England, in which he mentions the capture of two other specimens. One of these it appears was taken on the evening of 25th June last, by a schoolboy, as it was hovering over a flowering plant of *Delphinium* in a garden at Dover. The other example was seen on the night of 2nd July, flying around one of the gas-lamps at a railway station near Reading, and was secured by Mr. W. Holland. It is, perhaps, noteworthy that the last specimen referred to was taken at light on the same evening that Mr. Christy found one in his illuminated moth-trap (Entom. 254). At the last meeting of the London Entomological Society, Mr. Kirby remarked that *Plusia moneta* had occurred in some numbers in Holland.—ED.]

PLUSIA MONETA.—With reference to the description of the larva (Entom. 288), it is correct. I have preserved specimens in my collection. Of this species there is a not uncommon variety of the imago in Amurland (Siberia), in which the fore wings are shining silver-white, instead of the golden grey in the type. I have specimens of both.—N. F. DOBRÉE; Beverley, Yorks.

ACRONYCTA ACERIS IN SEPTEMBER.—I took a specimen of *Acronycta aceris* at Enfield, on the evening of the 17th September last, at sugar. Is not this a very late date for this species?—H. D. SYKES; "The Cedars," Enfield, Middlesex, October 11, 1890.

HELIOTHIS ARMIGERA AT CHATHAM.—On the 5th of last month, while I was strolling about the waste ground at the extension works in Chatham Dockyard, I disturbed a fine specimen of this moth, which fluttered up from among some rank herbage at my feet, and settled again a few yards off. Unfortunately, I had not a net with me, and my efforts to secure it in my cap were unavailing, as it was too wary and active, and eventually took a long flight, and I saw it no more. This is only the third example I have met with in England during the many years I have been collecting.—GERVASE F. MATHEW; H.M.S. 'Tyne,' Gibraltar, October 4, 1890.

VARIETIES OF ARCTIA CAIA.—Referring to Mr. W. T. Pearce's note on *Arctia caia* (Entom. 291), I may mention that I have this year bred a female specimen of *A. caia* with the usually white portion of the fore wings suffused with a pale pinkish hue. I may add that I obtained the larva (with others) from Walthamstow in the spring, and fed it principally on dock, though I gave it lettuce for a day or two.—HENRY A. HILL; 132, Haverstock Hill, Hampstead, N.W., Sept. 15, 1890.

On the 24th of July a boy brought me a fine dark female of *A. caia* to pin and set for him. It had certainly rubbed itself a little, but only slightly. Fore wings deep chocolate; hind wings black, except at the base, which is reddish orange; abdomen black, with a narrow red

stripe at each side. The boy found twelve larvæ, six of which he gave to me. Mine produced the ordinary form, whilst from one of the six he kept the above var. was obtained. I should add that the larvæ were found at the edge of Laxley Moor, about five miles from Sheffield.—J. BATTY; 65, Fawcett Street, Sheffield, September 22, 1890.

LARVA OF *DILOBA CÆRULEOCEPHALA* ON LAUREL.—In reference to Mr. Butler's note on the food-plant of *Diloba cæruleocephala* (Entom. 327), I may state that for the last three years I have taken plenty of the larvæ of this species off the laurel bushes in the college grounds. I tried feeding them on whitethorn, but they seemed to prefer the laurel. It would be interesting to know how these larvæ manage to neutralize the hydrocyanic acid contained in the leaves of their food-plant, and which is so fatal to them in the perfect form.—D. H. S. STEWART; Radley College, Oxford.

[In 'Weekly Entomologist,' i. p. 94 (1862), Rev. J. Hellins writes, "*D. cæruleocephala*. A number of larvæ once found on laurel."—E. A. F.]

HERMAPHRODITE *TRICHIURA CRATEGI*.—On the 26th August last, I bred a distinctly hermaphrodite specimen of the above moth. The right upper wing bears an exact resemblance in shape, colour, and markings to that of an ordinary male, whilst the opposite wing has all the characteristics of the female. The underwings are, unfortunately, very imperfectly developed, but it can be seen that they are identical with those of a male and female respectively; as also are the antennæ. I would also mention that the left side of the body and corresponding legs are brown, the opposite side and legs being grey, and agree with the colours of the respective sexes.—W. H. JACKSON; 4, Queen Anne Villas, Grove Road, Walthamstow, September 24, 1890.

NOTES ON THE SEASON.—The following observations, in addition to those which have already appeared in the 'Entomologist,' of the season which is fast closing, may be of interest. The notes taken refer to parts of North Somerset until the middle of June, and to the lower part of South Wales until the end of September, with the exception of the latter part of June on the Cotswolds. In January and February I frequently noticed *Phigalia pedaria* (*pilosaria*) at rest and on gas-lamps in Bath. Noctuæ, frequenting the sallow bloom, were fairly abundant in different localities, but not nearly so much so as the previous season. *Tephrosia crepuscularia*, *Anticlea badiata*, and *Selenia bilunaria* were fairly abundant. Of the Rhopalocera, *Euchloë cardamines*, *Lycæna icarus*, and *L. minima* were plentiful, the last named locally so. Larvæ of the spring and early summer feeding species were very abundant, notably *Zygæna filipendulæ*, *Bombyx neustria*, *Hybernica defoliaria*, *Oporabia dilutata*, *Selenia bilunaria*, *Crocallis elinguaria*, *Himera pennaria*; and the oak trees were completely riddled by myriads of *Tortrix viridana*. On the Cotswolds, *Lycæna icarus*, *Argynnis euphrosyne*, and *Euchloë cardamines* were common; the last named was observed on June 25th, the latest. In Wales I found species very variable in numbers, some of the commoner, as *Xylophasia monoglyphæ*, *X. lithoxylea*, *Triphana pronuba*, *Apamea didyma* (*oculea*), *Phlogophora meticulosa* (September), being very abundant; whilst, on the other hand, less common species were conspicuous by their absence. The second brood of the Pieridæ was extremely plentiful; also *Lycæna icarus*; *L. astrarche*, fairly so; *Hesperia thauamas* was common; and *Argynnis paphia*, *Vanessa io*, and *V. urtica* were in fair numbers; but I did not observe *V. cardui*.

"Sugaring" during the season was little more successful than last year, the scarcity of some species being, I believe, the cause, on account of their absence on favourable evenings. As a consequence of the abundance of larvæ, doubtless, the Ichneumonidæ were numerous early in the season; so also were the "sawflies."—T. B. JEFFERYS; (Clevedon) Cirencester.

APAMEA OPHIOGRAMMA AT HAMPSTEAD.—It may be of interest to the readers of the 'Entomologist' to know that I took in my garden here two specimens of *Apamea ophiogramma*; the first on June the 23rd, and the second on August the 12th.—E. H. EVANS; 3, Thurlow Road, Hampstead.

[Probably our correspondent has some of the ornamental ribbon-grass growing in his garden. This plant is said to be the food of the larva of *A. ophiogramma*.—ED.]

OXYPTILUS LÆTUS ON THE KENTISH COAST.—I captured some specimens of this plume-moth, on June 8th, between Dover and St. Margaret's Bay. On July 13th I took a few more at Deal, or, rather, at the Sandwich end of the sand-hills.—W. PURDEY; 129, Sea View Terrace, Folkestone.

ZANCLOGNATHA EMORTUALIS.—It may perhaps interest you to learn that I possess a good specimen of this insect, which was taken a good many years ago by the Rev. W. T. Bree, of Allesley Rectory, near Coventry, but I do not know any of the particulars of its capture.—(Rev.) HENRY BURNEY; Wavendon Rectory, Bletchley Station, Bucks, October 4, 1890.

[On June 12th, 1859, the late Mr. Charles Healy beat a specimen of *Z. emortualis* out of a beech tree near the King's Oak, Epping Forest (E. W. I. vii. 188; Zool. xx. 8296). Mr. Machin exhibited it at the Entomological Society of London on December 2nd, 1861. I saw the specimen sold at Stevens's a few years ago, but I forget the date and who was the purchaser.—E. A. F.]

SCARCITY OF LEPIDOPTERA.—I spent the first three weeks of August at Staplefield, near Crawley, Sussex. The weather was bad for the time of year, being cold and wet nearly every day, with an occasional thunder-storm. As far as appearances went the country looked very promising for collecting in. There were numerous small woods close to the house in which I was staying, with rough fields between them. Beating the hedges by day only produced a few of the commonest Geometræ and Tortrices, while sugaring was an utter failure, as I did not see a single moth, although the evenings when I tried were, to all appearances, most favourable, being calm and damp. The only larvæ noticed were a few broods of *Pygæa bucephala* and a solitary *Smerinthus ocellatus*.—GERVASE F. MATHEW; H.M.S. 'Tyne,' Gibraltar, October 9, 1890.

LIST OF BUTTERFLIES TAKEN AND SEEN NEAR AND AT MONMOUTH IN SEASONS 1889 AND 1890. — PIERIDÆ. — *Gonepteryx rhamni*. *Pieris brassicæ*, *P. rapæ*, *P. napi*, common. *Anthocharis cardamines*, common. NYMPHALIDÆ.—*Argynnis paphia*, common; *A. adippe*; *A. euphrosyne*, plentiful; *A. selene* (?). *Melitæa artemis*, Cwmcarvan. *Vanessa c-album*, plentiful; *Vanessa urtica*, plentiful; *V. polychloros*, 1 specimen, Aug. 23rd, 1890; *V. io*, common; *V. atalanta*; *V. cardui*, occasional. APATURIDÆ.—*Apatura iris*, several (two females taken while settled on ground). SATYRIDÆ.—*Melanargia galatea*; *Pararge egeria*, plentiful; *P. megara*, plentiful. *Epinephele ianira*, plentiful; *E. tithonus*, not common; *E. hyperanthes*, fairly plentiful. *Cænonympha pamphilus*, common. LYCENIDÆ.—*Thecla*

rubi, in June; *T. quercus*, not common; *T. w-album*, 1 specimen, July 29th, 1890. *Polyommatus phlœas*. *Lycæna icarus*; *L. argiolus*. HESPERIIDÆ.—*Syrichthus alveolus*, plentiful. *Thanaos tages*, plentiful. *Hesperia sylvanus*, fairly common; *H. thaumas* (= *linea*), fairly common.—(Rev.) GERARD W. PALMER; The Vicarage, Monmouth.

ABUNDANCE OF CERTAIN LARVÆ.—As a set-off against the scarcity of Lepidoptera, I have to record the extreme abundance of *Eupithecia* larvæ at Chatham and Sheerness. At the former place there is a considerable tract of waste land in that part of the Dockyard known as the "Extension Works." This, at the beginning of September, was overgrown with a profusion of wild flowers, consisting chiefly of ragwort, sea aster, thistles of various kinds, willow herb, *Chenopodium*, *Atriplex*, coltsfoot, chamomile, &c. In the former the larvæ of *Eupithecia oblongata* (*centaureata*) and *absynthiata* literally swarmed, as many as fifty being knocked out of a single bunch of flowers, and hardly any two larvæ were exactly alike, so it is possible there may be other species than the two mentioned. From *Chenopodium* and *Atriplex* larvæ of *E. subnotata* were freely obtained, together with a sprinkling of *Hadena trifolii* (*chenopodii*) and *oleracea*. At Sheerness, towards the end of September, I found *Chenopodium* and *Atriplex* growing luxuriantly on the sea-bank beyond Marine Town; and here the larvæ of *subnotata*, *chenopodii* and *oleracea* were in prodigious numbers, and the latter might be seen in hundreds feeding fully exposed during the day, and stripping the erect stems of the *Atriplex* of every vestige of flower, seed, or leaf. After lifting with my walking-stick and shaking the trailing stems of one moderate-sized plant of *Chenopodium*, I counted more than a hundred larvæ of *E. subnotata* lying on the ground below. The grey-coloured larvæ were in proportion of 6 per cent. to the green ones.—GERVASE F. MATHEW.

AUTUMNAL LARVÆ.—In the neighbourhood of Lowestoft, this year, where I stayed from middle of August to middle of September, the larvæ, even of the common kinds, were conspicuous by their absence, with one exception, that of *Euchelia jacobææ*, which were in large numbers, every small plant of ragwort having five or six on it. In this neighbourhood (St. John's Wood) many gardens are stripped by the larvæ of *Mamestra brassica*, *M. persicariæ*, *Pieris brassica*, and other common species.—T. G. WILLIAMS; 13, Elm Tree Road, St. John's Wood, Oct. 13, 1890.

ANOTHER PLAGUE OF CATERPILLARS.—Many of your readers, no doubt, are already aware of the extraordinary abundance this autumn of the larvæ of *Liparis monacha* in Southern Germany, and especially in Bavaria; and as I have not seen it noticed in the 'Entomologist,' it may be useful to do so for the sake of future reference. A letter in the 'Standard' newspaper, of 23rd August, gives a good descriptive account of the havoc it has created; and the 'Illustrierte Zeitung,' of 6th September, deals with it in greater detail. From this it can only be likened to a plague of locusts in and around Munich. It seems to have committed equal havoc in the woods in Northern Germany, as in Oldenburg, alone, seventy hectares were totally stripped by the larvæ, fir appearing to be chiefly affected. The same article states that the devastation is periodical in Western Russia and in East Prussia, where, within the last fifty years, "hundreds of square miles (German)" have been laid bare. On the last occasion, the plague was stopped by heavy gales of wind, which drove the insect in clouds over the Baltic, to be drowned there, and afterwards to be

washed up in such abundance "as to be carted away for manure"! What an opportunity our variety hunters have lost. Strangely enough, the 'Societas entomologica' makes no allusion to its extraordinary profusion this year.—N. F. DOBRÉE; Beverley, E. Yorks.

A LONG DAY'S COLLECTING.—I was staying at Wicken, and on Sunday, July 20th, I drove into Ely to meet my brother, who was coming to see some collecting in the Fens, and I planned a long day for the morrow. We arranged with the bricklayer for the hire of his pony and cart, and started next morning for Tuddenham. As we drove along we kept our eyes open for moths sitting on the roadside trees and fences. When we reached the sandy soil of Suffolk, with its belts of fir trees, we carefully searched a Scotch fir plantation, and were rewarded by finding two specimens of *Anticlea sinuata* at rest on the trunks, also two *Pseudoterpna pruinata* (= *cytisaria*), several *Acronycta psi*, *Hecatera serena*, &c. Further on along the road we found one *Thera firmata* and two *Porthesia auriflua*, the latter just emerged and drying their wings. Of the *A. sinuata* one was a female, so I kept it alive for ova; it laid eggs freely on the flowers and stalks of the lady's bedstraw (*Galium verum*). The eggs were bright yellow, and resembled the unopened buds of the *Galium*,—consequently were very difficult to distinguish. (The larva is very handsome; it has a gamboge-yellow stripe along the middle of the back, and on each side of this stripe is one of jet-black. The lower half of the body is green. The larvæ were full fed at the end of August, and made cocoons on the surface of the ground, or, a few only, among the flowers and seeds of the *Galium*.) When we reached Tuddenham we tied up our pony to a fence, and, leaving him to eat his corn, we made a search for the larva of *Lithostege griseata*. It feeds upon a species of wild mustard (*Sisymbrium Sophia*). The plant, when in seed, has a light, waving, and almost feathery appearance; it grows in neglected corners of cultivated fields, and sometimes among the corn itself. The larva is not easy to find, as it very much resembles the seed-pods upon which it feeds, both in its shape and colour. We took about fifteen, and then gave it up, and drove back to the top of Tuddenham Hill, there to look for the larva of *Dianthæcia irregularis* on its food-plant, *Silene otites*, an inconspicuous little plant growing among the grass at the roadside. Of the few larvæ which we found I took two that were partially inside the seed-pod, and this gave me the clue to what had puzzled me about this larva last year. I had on that occasion gathered a bunch of the *S. otites* for food. There were no eggs upon it that I could discover. This bunch of food was tied up in a bag, and a week subsequently I found upon it quite a number of larvæ of *D. irregularis*, all about one-third of an inch long or larger. No doubt they were already hatched when I gathered the *S. otites*, and they were feeding concealed within the seed-pods after the manner of the rest of the genus *Dianthæcia*, but the smallness of the seed-pods had misled me. By this time it was four o'clock, and, being still a dozen miles from Wicken, we began to turn our heads homewards. It was a beautiful day, and from the top of Tuddenham Hill the cathedral at Ely was plainly to be seen at a distance of some twenty miles. On our way home we stopped at the village of Fordham, and after tea, at the 'Dragon,' we walked down to Chippenham Fen (we had obtained leave to collect there). On our way through the fields we beat an old high thorn-hedge, and secured one *Toxocampa pastinum*, one *Nudaria mundana*, one *Macaria liturata*, and one *Acidalia imitaria*. A few days previously I had beaten out of this

same hedge six fresh specimens of *Aventia flexula* and lots of Geometræ. While waiting for the dusk to come on we walked about among the sedge, and took a few *Cænobia rufa* (= *despecta*) flying over ditches. Chippenham Fen is cut up and intersected by belts of trees; along the outsides of these belts are wide rides. At the edge of these rides and about the ditches grow masses of hemp agrimony, the food-plant of *Plusia orichalcea*. This was our particular quarry, and very exciting it was watching for this rare moth at the thistle-heads, in the dim light, while the nightjars rattled and the fen gnats sang round one's mosquito veil. Many a dash did we make with the net, and mostly was it only a despised *P. chrysitis* that we had caught. Still we managed to secure four specimens of *P. orichalcea* that evening. It was a very warm night, and lots of things were on the wing; we took *Hepialus humuli* (rather late I think), and three specimens of *Toxocampa pastinum*; but we did not stop after darkness had fairly set in. When we got back to Wicken it was 11 p.m. One *Pelurga comitata* and one *Cidaria imitaria* were flying about in the house, and, having secured these and eaten a mouthful of supper, we walked down to Wicken Fen, where Bailey was already at work with the "light." He had got several moths; among them one *Pterostoma palpina*, one cream-coloured variety of the male *Odonestis potatoria*, one *Bombyx quercus*, two or three battered *Lasio-campa quercifolia*, *Epione apiciaria*, and lots of *Acidalia immutata*. The air had now turned chilly, and nothing much came to the light for some time, so we "shut down" the light, as they say in the Fens, and went for our beds, the only further catch of any note being one *Tapinostola helmanni*, the first of the season. The season was very late in the Fens this year; flowering plants appeared to me to be three weeks behind last year, and many of the moths and larvæ also.—W. M. CHRISTY; Watergate, Emsworth.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—Oct. 1st, 1890. The Rt. Hon. Lord Walsingham, M.A., F.R.S., President, in the chair. The Rev. Dr. Walker exhibited, and read notes on, a long and varied series of forms of *Crymodes exulis*, collected in June and July last in Iceland. In reply to a question by Lord Walsingham as to whether all the forms referred by Dr. Walker to *C. exulis* had been identified as belonging to that species, Mr. Kirby said the species was a very variable one, and that several forms had been described from Labrador and Greenland. Mr. South stated that he had examined Dr. Walker's specimens, and he believed that most of the forms exhibited had been described by Dr. Staudinger, in his papers on the Entomology of Iceland, as varieties of *C. exulis*. Dr. Sharp exhibited a specimen of *Ornithomyia avicularia*, L., taken near Dartford, to which there were firmly adhering—apparently by their mandibles—several specimens of a mallophagous insect. He also exhibited some specimens of fragile Diptera, Neuroptera, and Lepidoptera, to show that the terminal segments in both sexes might be dissected off and mounted separately without the structures suffering from shrivelling or distortion. Dr. Sharp also said, in reference to the statement made by him, on p. 421 of his paper recently published in the 'Transactions' of the Society, as to the number of the segments of the abdomen, and the position of the genital orifice in the female of Hemiptera-Heteroptera, that he had recently been making some dissections, and found that the structures externally were difficult of comprehension, and he now thought

that the statement he had made from observation, without dissection, might prove to be erroneous. Mr. G. F. Hampson exhibited and remarked on a series of *Erebia melas*, taken in July last, in the Austrian Alps (Dolomites), by Mrs. Nicholls. Captain Elwes observed that this species was abundant in the Pyrenees; but although he had frequently suggested to Dr. Staudinger and other European lepidopterists that it probably occurred in the Swiss or Austrian Alps, he had never been able to obtain specimens from any part of Europe except the Pyrenees; and that it had been left to an English lady to be the first to take a species of *Erebia* new to these Alps. He added that the species only frequented very steep and stony slopes on the mountains, so that its capture was attended with difficulty. Mr. M'Lachlan exhibited specimens of an extraordinary Neuropterous larva found by Mr. B. G. Nevinson in tombs at Cairo. He said that this larva had been assigned to the genus *Nemoptera* by Schaum, who described it as having been found in tombs in Egypt (Berl. Ent. Zeitschrift, vol. i.); and Roux had previously (Ann. Sci. Nat. t. xxviii.) described and figured it as an abnormal apterous hexapod under the name of *Necrophilus arenarius*. Mr. Nevinson supplemented these remarks with an account of his capture of the specimens in the Egyptian tombs. Mr. G. T. Baker exhibited a series of forms of species of the genus *Boarmia* from Madeira; and also a series of melanic varieties of *Gracilaria syringella* from the neighbourhood of Birmingham. Mr. W. F. H. Blandford exhibited and remarked on a series of specimens of *Dermestes vulpinus*, which had been doing much damage to the roofs of certain soap-works in the neighbourhood of London, where it had no doubt been introduced with bones and fat. Mr. R. W. Lloyd exhibited a specimen of *Carabus catenulatus*, in which the femur of the right fore-leg was curiously dilated and toothed. He stated that he took the specimen at Oxshott, Surrey, on the 27th September last. The Rev. C. F. Thornewill exhibited a black variety of the male of *Argynnis aglaia*, taken by himself in July last on Cannock Chase; also a number of living larvæ of a species of *Eupithecia* feeding on the flower-heads of *Tanacetum vulgare*, collected in a limestone quarry in Leicestershire. He expressed some doubt as to the identity of the species, but the general opinion was that the larvæ were only those of *Eupithecia absynthiata*. Mr. G. Bryant sent for exhibition a variety of the larva of *Trichiura cratægi*. Mr. C. G. Barrett exhibited a specimen of *Plusia moneta*, Fabr., a species new to Britain, taken at Reading by Mr. W. Holland in July last. It was stated that the first specimen of this species captured in this country had been taken at Dover last June, and was now in the collection of Mr. Sydney Webb, of that town. Mr. Kirby said that Mynheer Snellen had reported this species as being unusually common in Holland a few years ago. Mr. W. Dannatt exhibited a variety of *Papilio hectorides*, ♀, from Paraguay. Mr. Osbert Salvin said he believed he had seen this form before. Mr. C. J. Gahan exhibited a curious little larva-like creature, found by Mr. Green in a rapid mountain stream in Ceylon, and observed that there was some doubt as to its true position in the animal kingdom. It was made up of six distinct segments, each of which bore a single pair of laterally directed processes or unjointed appendages. Mr. Hampson remarked that the appendages were very suggestive of the parapodia of certain chætopod worms, but that all the known polychætous worms were marine. Lord Walsingham and Mr. M'Lachlan expressed an opinion that the animal was of myriopodous affinities, and was not the larva of an insect. Mr. Baker read a paper entitled "Notes on the genitalia of a gynandromorphous *Eronia hippia*."—H. Goss, Hon. Sec.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.
 —Sept. 25th, 1890. J. T. Carrington, F.L.S., President, in the chair. Mr. S. C. G. Russell exhibited interesting varieties of *Zygana trifolii*, Esp., including var. *confluens*, Stgr., from the New Forest. Mr. Mera, *Acronycta ligustri*, Sch., from South Devon; also a banded variety of *Argynnis euphrosyne*, L., from Chattenden. Mr. E. Joy, two forms of the under side of *Lycæna minima*, Fues. Mr. C. Fenn, *Cidaria immanata*, showing all the varieties generally occurring at Aberdeen; also dark varieties, from York; specimens of *Agrotis cursoria*, Bork., from Aberdeen, showing the extremes of variation there; and a specimen of *Ephestia ficulella*, Bor., taken in the Society's rooms. Mr. J. Jäger, box of insects taken in the Isle of Man, including *Epunda nigra*, Haw., *Stilbia anomala*, Haw., *Agrotis tritici*, L., and a few specimens of *A. simulans*, Hufn., &c., taken at the flowers of ragwort; also *Cirrhædia xerampelina*, Hb., which Mr. Jäger stated were mostly found at the bottom of the ash trees, among the dead leaves, which the moth closely resembled. Among the other exhibits of Mr. Jäger were some specimens of *Callimorpha hera*, L., and he remarked that he was somewhat surprised to find that there was still some doubt as to the authenticity of the captures in Devonshire: some discussion ensued, in the course of which Mr. C. G. Barrett stated that there was no doubt about the authenticity of the recent captures,—the difficulty referred to its probable introduction. Mr. Wellman, series of *Hyponomeuta padellus*, L., *H. cagnagellus*, Hb., and *H. evonymellus*, L. Mr. R. Adkin, larvæ of *Apamea occulta*, L., some having obtained full growth; also *Myelophila cribrum*, Schiff., and *Homæosoma binævella*, Hb., from the Essex coast, and remarked upon the protection afforded to these two species when resting upon thistles, by their resemblance to the seeds of certain grasses. Mr. Bright, a box of varieties of Lepidoptera, including many of the genus *Argynnis*, the black form of *Limenitis sybilla*, L., forms of *Taniodampa gracilis*, Fb. (New Forest), *Boarmia repandata*, L. (Scotch), and of *Vanessa urticæ*, L., &c. In reply to Mr. Tutt, who expressed an opinion that the last-named was an example of *V. milberti*, Mr. Bright said that the specimen had been sent him by a Mr. Mumford, and was said to have been taken at Polegate in 1888.

Oct. 9th.—The President in the chair. Mr. W. E. Butler, of Reading, was elected a member. Adverting to the specimen of *Vanessa* exhibited at the last meeting, and said to have been taken at Polegate, Sussex, Mr. Jenner Weir stated that, in his opinion, the insect in question was *Vanessa milberti*, a well-known North American species, of which he exhibited specimens from the Canadian North-west provinces, and also specimens of *V. urticæ* from Hong Kong, Luleo in Sweden, and St. Petersburg, showing how very little the species varied in these widely separated localities, differing also so much as they did in climate, Hong Kong being within the tropics, and Luleo but just outside the arctic circle. Mr. C. G. Barrett exhibited the specimen of *Plusia moneta*, Fab., taken near Reading by Mr. Holland, and stated that, in his opinion, the species was moving northwards. Mr. South, specimens of *Noctua festiva*, Hb., with varieties, and made remarks thereon. Mr. C. Fenn, *Tryphæna comes*, Ill., var. *curtisii*, Newm., and dark forms from Aberdeen; *Agrotis simulans*, Hufn., *Acronycta euphorbiæ*, Fb., *Agrotis nigricans*, L., *Sciaphila octomaculana*, Haw.,—all from Shetland, and showing a melanic tendency. Mr. Tutt, on behalf of Lieut. Brown, *Agrotis simulans*, Hufn., from Portland, with Scotch examples for

comparison. Mr. T. D. A. Cockerell, *Colias eurytheme*, Bdv.,—forms (1) *amphidusa*, Bdv., (2) *keewaydia*, Edw., (3) *ariadne*, Edw., (4) *eriphyle*, Edw., from the United States,—and made remarks relative to his exhibit. Mr. E. Joy, living larvæ of *Toxocampa pastinum*, Tr. Mr. Tugwell, bred specimens of *Heliophobus hispidus*, Hb., and said it was just possible in some of the specimens to see a violet tinge. Mr. A. E. Cook exhibited nests of *Vespa sylvestris* from Bagshot, Surrey. Mr. Moore, nests of several species of British and foreign wasps. Mr. Billups, *Epeolus productus*, Thoms., taken at Chobham; also a series of *Trichomma enecator*, Rossi, bred by Mr. Adkin from *Peronea hastiana*, L.; and male and female *Pelecystoma lutea*, Nees, bred by Mr. Adkin. Mr. Billups contributed notes relative to his exhibit.—H. W. BARKER, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—September 15th, 1890.—Rev. C. F. Thornehill, V.P., in the chair. Mr. C. Runge, Broad Street, Birmingham, was elected a member. Mr. E. C. Tye showed *Cymatophora duplaris* from near Tamworth. Mr. G. W. Wynn showed *Euperia fulvago*, taken by Mr. Tye, on Cannock Chase, at rest on bracken. Rev. C. F. Thornehill showed *Cidaria populata* and *testata*, and *Eucosmia certata*. Mr. P. W. Abbott showed *Boarmia repandata*, including var. *conversaria*, taken on sugar at Porlock, Somersetshire. Mr. R. C. Bradley read a paper “On three days’ collecting on Cannock Chase in August,” and showed the insects taken, which included *Helophilus trivittatus* among Diptera, and *Chrysoclista bimaculella* among Lepidoptera.

October 6th.—Mr. W. G. Blatch, President, in the chair. Mr. P. W. Abbott showed *Xylophasia scolopacina* from Arley. Mr. W. G. Blatch showed *Homalota crassicornis*, a beetle which he believed to be new to England: the only record with which he was acquainted of its capture in Britain was of three specimens taken in Scotland. He also showed *Euryphorus picipes*, a beetle new to the Midlands. Mr. W. Harrison showed a small collection of insects made this year in the New Forest, between July 19th and 26th, and described his experiences there.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

OBITUARY.

OWEN S. WILSON died at Cwmffrwd, Carmarthen, on the 25th of August last. He was the only son of the late Mr. John Wilson, County Court Judge in South Wales, and Recorder of Carmarthen; a barrister by profession, though he had not been practising for some years. He appears to have been a zealous Volunteer, and had attained the rank of Lieut.-Colonel after twenty years’ service. In 1874 he was elected a Fellow of the Entomological Society of London, and has long been known as a most ardent and hard-working lepidopterist. His ‘Larvæ of the British Lepidoptera,’ an important work of 367 pp. and 40 coloured plates, published in 1880, met with a most favourable reception at the hands of Lepidopterists. For some time past he had been actively engaged in preparing for the press a more comprehensive work, dealing with the Life-Histories of Lepidoptera, in which it was proposed to give plates, each representing life-sized figures of one or two species in all the different transformations from the larva to the imago, with, in many cases, the egg, and invariably the food-plant of the larva; all the figures drawn from Nature by Mrs. E. Wilson.

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EDITORIAL.

EARLY in the present year we were favoured by various correspondents with kindly suggestions as to the future of the 'Entomologist.' As might perhaps be expected, these suggestions were very diverse, and, anxious as we were to meet the wishes of our correspondents, we found such a course impracticable, seeing that they belonged to one or other of the following classes of specialists:—

- a. Those who are chiefly interested in the formation of a collection of insects, and who desire a restriction of the space allotted to matters pertaining to the study of Entomology, and an extension of that allotted to field work and exchange.
- b. Those who are chiefly concerned in the biology of insects, and do not regard with any favour the accounts of work done by collectors in various districts.
- c. Those who are interested in the insect fauna of Britain alone, and cannot appreciate, or even tolerate, papers on insects from regions which they consider outside their sphere.

An attempt to satisfy either of these would only have resulted in strained relations with the other two; and, besides, we did not deem it desirable to narrow down the scope of the 'Entomologist' to the requirements of a class, even if we could have supposed that there were many among our readers as exclusive as some of our correspondents seemed to be. In

conducting this Journal, the primary object we have in view is to make it widely and generally useful. We have every reason to believe that our readers are, as a whole, well disposed towards us, as also to each other, and desire to assist, "by mutual confidence and mutual aid," in the attainment of our purpose.

The suggestions of our readers will always receive due consideration; but we would point out to those who do not wish the publication of such papers as those on the insect fauna of China, that others are interested; that they are a valuable contribution to scientific knowledge; and that they do not interfere with the space devoted to British or non-descriptive Entomology, as additional pages are always given when such papers are published.

It would seem almost unnecessary to say that we highly value, and now again ask our readers for, notes on British Entomology, records of captures, &c. An analysis of the contents of the present volume will show that, as regards this class of matter, the volume for 1890 is equal to its immediate predecessors, and distinctly in advance of all the others.

We are glad to say that the 'Entomologist' has already an increased circulation abroad, and that it still maintains the position it has so long held in this country. These facts, taken together, should make it apparent that as a medium for the interchange of views and opinions on entomological matters the Journal has gained in value. It may not, perhaps, be of direct importance to some of our contributors whether their papers or notes are read or not by entomologists abroad, but indirectly it does concern them, because the larger the circulation of the 'Entomologist' so much greater will be the surplus to expend on plates and extra pages.

The present volume contains 400 pp. and 4 plates. That for 1889, 320 pp., 8 plates, and 1 portrait; for 1888, 336 pp. and 1 plate; for 1887, 344 pp. and 2 plates. The number of plates in 1889 was in excess of that for this year; but it is, perhaps, not generally known that the cost of the four plain plates and half that of one coloured one was defrayed by the authors of the papers which they illustrated.

NOTES ON THE RHOPALOCERA OF WEST NORFOLK.

By A. SMITH.

OF this division of the Lepidoptera, sixty species are given as having occurred from time to time within the area of the Fens. The present notes merely refer to this immediate neighbourhood, say within the confines of a day's walk. Many other species are said to be found at a distance of a mile or two; but three or four years of close observation has produced only the limited number of sixteen species. I may add that a drive to such places as Wisbeach, March, Manea, Upwell, through Bardolph Fen to Lynn, or prolonged walks in various directions, has not afforded any additional species to those found at home. I can walk along one ditch alone and find eleven of the number in one day in August, and during that month the lot could be seen there, with one exception, the orange-tip. The district is poor as regards species. Agriculture, with its consequent drainage improvements, has deprived the fens of some grand old species, while the advantages of cultivation have only favoured such common ones as the whites, small tortoiseshell, and the like. The present notice chiefly refers to the last three seasons. The lateness of appearance of the perfect insect, in most instances, may be accounted for by the flatness of the district, the prevalence of east winds, and the backwardness of vegetation.

Pieris brassicæ.—The remark sometimes applied to this species, that it outnumbers nearly all our native butterflies, does not apply to this locality, for, in reality, it is numerically deficient when compared with *P. rapæ*, and sometimes, as was evident this season, with *P. napi*. The fly is fairly abundant during the latter half of May and throughout June; with the advent of July it falls off rapidly, abounding again when August is reached, being the most profuse in that month, and on to the first week in September, when the species begins to fail. Larvæ numerous on cabbage; have seen them feeding down to the first week in November.

1888: May 21st—September 19th. 1889: May 8th—September 17th. 1890: May 7th—September 19th.

P. rapæ.—This is really the domestic butterfly, as regards abundance in this restricted spot. It far exceeds the last, beginning its career occasionally in April, becoming very numerous in May and June; a slackness during the first ten days of July is succeeded by great numbers from that time onwards. During August the gardens, pastures, and more especially the clover fields, are alive with the whites, of which this species is by far the greatest contributor. In September it is also plentiful, appearing less after about the third or fourth week. I have

noticed fine specimens of this insect with the under surface of hind wings a beautiful yellow. Larvæ feeding upon their usual fare as late as the frosty mornings of November.

1888: May 21st—September 26th. 1889: April 27th—September 27th. 1890: April 5th—October 14th.

P. napi.—Another common butterfly, more so perhaps than is generally admitted, because this and the last run counter to each other, owing to their being placed in the same category, viz., the middle-sized whites; and for this cause I do not deal with this insect with the same amount of certainty as with all the rest; the experience of the past season has confirmed my opinion that I have hitherto under-estimated this fly as regards individuals. The greatest plenty, it has been noticed, was in May, 1889, on a piece of marsh land, where *Cardamine pratensis* was in flower and very plentiful. The insect was fluttering about in all directions, leaning most to a damp spot of several acres in extent, which was alive with them. This profusion of any one species in a given locality has only once been exceeded in my experience, which was an August brood of the wall-butterfly. The present species starts its season in April, but it is not till May is fairly in that it is seen in average numbers. During June it does not occur as commonly as the two preceding species of *Pieris*; from the middle of July and through August it is plentiful enough, resorting now more to cultivated tracts, scarcely occurring at all on the above-mentioned marshland. In September this fly apparently fails about the third week. Some of the individuals met with are very small. Caterpillar is said to feed upon rape (*Brassica napus*). Personally I have never found it on that plant, but have seen large batches of them faring upon "kohl rabi" (*B. oleracea caulo-rapa*); it doubtless also feeds on ordinary garden greens.

1888: May 22nd—October 1st. 1889: May 4th—September 29th. 1890: April 28th—October 9th.

Euchloë cardamines (*Anthocharis cardamines*).—Perhaps of all our butterflies this has the most characteristic name, at least as regards the male. This flying flower is the pretty insect that comes careering across the croquet lawn on a fine June afternoon, seldom failing to elicit a remark from our non-entomological players; but it may be safe to say the lady insect loses the honour conferred upon her more attractive partner. This fly is generally considered to be abroad in April, but here in our flat, bleak district it does not occur till May, and not before the end of the third week. After once out, however, it is to be seen almost daily for the remainder of the month to about the middle of June, after which it falls off rapidly. Was most abundant of all in June, 1888; and on June 26th, 1889, I noticed a solitary male at Manea in Cambridgeshire. I have noticed no variation in the orange patch, neither met with the species in the preliminary stages,

1888: May 24th—June 28th. 1889: May 23rd—June 26th.
1890: May 21st—June 18th.

Pararge megæra (*Lasiommata megæra*).—By far the most uniform in its appearance of any of the double-brooded species, and also the one that can claim to have occurred in the greatest profusion. A fen drove, with a drain one side and a ditch on the other, about a mile long, sheltered on both sides by standing corn-fields, was the scene of the August brood of this butterfly, in the dry season of 1887, which literally swarmed there. Like the green-veined white, they vary much in wing area, more so than any other species on my list; in fact some specimens did not much exceed a small copper-butterfly, and I noticed these were much darker in colour than the finer ones, or perhaps it would be safer to say that in the larger individuals the fulvous ground covers proportionately more space. The insect usually appears about May 24th, but the brood is limited, lasting only twenty-four days; and I have not known it to endure to July, neither the second to begin in that month. This second is by far the most extensive, being met with in plenty daily through August, continuing to September, gapping considerably from the middle of the month. This warmth-loving species is the most subject of any I know to the loss of a secondary wing, which, by-the-bye, seems to occasion but little inconvenience. Perhaps this insect is an article of diet with the voracious Neuroptera, as I once observed a dragonfly seize one, beginning at the head and eating downwards, the wings falling off on their respective sides; the creature did not eat the wings. This was one of the neatest mechanical operations I ever witnessed. Unobserved in preliminary stages.

1888: June 2nd—26th; August 20th—September 30th.
1889: May 23rd—June 14th; August 1st—September 23rd.
1890: May 21st—June 16th; August 5th—September 19th.

Epinephele ianira (*Hipparchia janira*).—Although a common and sober-coloured insect, this is still an interesting butterfly, appearing, as is its wont, about hay-time, showing to best advantage when freshly emerged, traversing the meadow eddish, or, better still, the pastures, which by this time have generally assumed a sun-scorched appearance; indeed, if it were not for this and the next species, many a tract of parched turf would be deprived of much of its life. It has also the additional habit of remaining on the wing during the dull portions of the day, as in the warmth of sunshine. What the butterfly teaches in the general term, this one carries out specifically: in this flying mirror we may see the importance of a cheerful spirit. The butterfly is abundant during July and August, decreasing, however, towards the close of that month. Two seasons I have noticed a single example in September. Unobserved in preliminary stages.

1888: July 8th—September 1st. 1889: June 26th—September 9th. 1890: June 23rd—August 25th.

E. tithonus (*H. tithonus*).—Sometimes called the small meadow-brown; and to some extent this twin-spotted species is a small edition of the last. I should estimate that it is not much more than a third so abundant as its larger congener. The flight is slow, and in its habits it seems to be much more sedentary; it is also on the wing for a shorter period. During 1888 only a few pairs were seen. In the present season it has been much more abundant. I noticed a batch of about eight individuals sporting about one plant. This also is the only year it has endured to September. Not seen in preliminary stages.

1888: July 20th—August 27th. 1889: July 8th—August 16th. 1890: July 16th—September 6th.

E. hyperanthes (*H. hyperanthus*).—Nature seems to have availed herself of this species to enforce the rule that in her whole realm there is no monotony, and has, so to speak, turned this butterfly up side down; and this fact may, or may not, have first suggested the idea to collectors of setting their specimens horizontally to show the under surface. This insect agrees in the main with the two last, but it is not such a plain-loving species, seeming to prefer more shade. I have been curious to notice that it flies deeper in the ditch than any other species, threading its way among the tangled vegetation, and often being seen to settle. Have noticed no variation in the characteristic ringlet-spots. The butterfly, a rather feeble flier, is on the wing but a very short period, and was most abundant in 1890. Unobserved in preliminary stages.

1888: July 13th—August 10th. 1889: July 6th—25th. 1890: July 10th—August 5th.

Cænonympha pamphilus.—This little butterfly is usually met with on grass-land, and seems to be a ground-loving species. It is never met with in quantity; singly or a pair is the most I have observed. This may be due to their small size, the tawny colour blending more or less with the drier grasses; therefore the insect is less conspicuous than the little blue or small copper butterflies. I have watched a pair sporting on a grassy bank only a few yards distant, yet were frequently lost to view among the herbage. The insect was most abundant in 1889 during June. May occasionally be seen in August, never lingering till September. For some cause I have not seen a specimen in 1890, this being the only absentee; about the time of its appearance the weather was excessively wet. Unobserved in preliminary stages.

1888: June 11th—July 10th. 1889: June 5th—August 31st.

Vanessa cardui (*Cynthia cardui*).—This butterfly appears to be a perfect cosmopolite, and is the most capricious of all, being fairly plentiful one season, and perhaps absent the next. In 1888 it was fairly common in the latter part of August and September; while in 1889 it was most abundant of all, being observable almost daily for a time in August, diminishing rather suddenly at the

close of that month. The only specimen observed in 1890 was on August 7th, one of the few warm days of the summer up to that date. Years preceding 1888 this insect did not appear at all. Hybernators are to be seen chiefly in June; I noticed one specimen as late as July 24th, 1890. Never seen in preliminary stage.

1888: August 9th—September 27th. 1889: August 6th—September 12th. 1890: August 7th.

V. atalanta.—While dealing with the genus *Vanessa*, two things strike the observer: first, that it suffers least when compared with its exotic congeners of warmer climes; and the second, that such handsome species should be so easily obtained. As nettles do not thrive so well apart from cultivation, this again tends to make the species the more familiar. This handsome species is, perhaps, the most gorgeous of all the British butterflies, being most bold and fearless in its habits. I once carried a specimen, that chose to locate itself on my arm, a distance of some fifty yards and into the house. The butterfly never appears till August; and even in this last late season I did not notice it in October. As autumn is the perfection of the farmer's year, so the red admiral, painted lady, peacock, &c., crown the butterfly season. Have never observed a hybernator of this species, nor discovered the larva.

1888: August 29th—September 19th. 1889: August 16th—September 10th. 1890: September 28th.

V. io.—Like the orange-tip, this species introduces itself to the observer, and is very common in the fens, being much more abundant in some seasons than others. In 1887 I reared a hat-box full of larvæ, turning off a hundred of this species and twenty-eight of the small tortoiseshell; but this bore no effect upon the succeeding wet season of 1888, when it was rather scarce and late. Since 1887 it was most numerous in 1889. The perfect fly is never seen till August, but lingers with us till late in the autumn, the specimens occurring at this time being often much bleached, and I always consider it a brittle species. Hybernators plentiful in the spring, abroad as early as April 4th.

1888: August 31st—October 2nd. 1889: August 5th—November 8th. 1890: August 7th—October 10th.

V. urticæ.—By far the most abundant of the genus, abounding everywhere on pastures, waste corners, &c., where nettles most abound. In three years I have only seen the butterfly out once in June. Half of July is gone before it is general; from that time it is common enough, generally out-lingering the other species, being often the only one to cheer the month of October. I have noticed some fine specimens of this insect, but the large tortoiseshell has never turned up. Was most abundant in 1890. Hybernators are out as early as March 17th. Patches of nettles are sometimes black with the larvæ of this and the peacock.

1888: July 17th—October 18th. 1889: June 28th—October 21st. 1890: July 14th—November 5th.

Polyommatus phlœas (*Chrysophanus phlœas*).—Of the three species of this genus allotted to Britain, this is the only one we can practically claim; for the purple-edged copper (*P. chryseis*) can only be considered as a visitor, perhaps the only plausible occurrence being that of Ashdown Forest, Sussex; while yet another, the scarce copper (*P. virgaurea*), is said to have been taken in the marshes of the Isle of Ely, and in Huntingdonshire. The large copper (*P. dispar*) used to swarm in the fens of Huntingdonshire and Cambridgeshire; the metropolis of the insect was apparently the vicinity of Whittlesea Mere; while a specimen is recorded from Bardolph Fen. Probably this was a border limit for the insect, as it is within a short distance of the higher ground, and possibly the only locality within our county. Bearing this in mind, I always give the water-dock a hawk's-eye view, when happening to meet with it. Although considered specifically distinct from the continental *P. hippothœe* by the older authors, I suppose now it is only considered to be a variety of that species, and its extinction in Britain favours this latter view, as I do not believe in the so easy extinction of a species, properly so called, and that confined to one spot of one island of a Continent. That it should exceed in size and vary in its markings is not conclusive evidence, seeing that the whole order is so much subject to variation; there always seems to be an accommodating process going on in nature, and this fen locality may have especially suited the development of this butterfly, as it does to-day a certain breed of farm stock. Our present little species is a lively insect, flashing about in much the same fashion as the blues, but is not quite so exploratory perhaps; the flights seem to be shorter and more rushing, as if to some destined spot. I have noticed that this and the blue often rest on the same flower-head, while this species would drive a larger insect than itself away. I have only once come across the insect in June, skipping about in the midst of a pasture, where sorrel was very plentiful, at just about the same height and manner as related of the small heath. The last batch is more often seen in the ditches, where a greater variety of wild flowers abound. This butterfly was most abundant in 1890, after the fine weather set in, lasting well into September. Unobserved in preliminary stages.

1888: June 14th. 1889: August 30th—September 11th. 1890: August 23rd—September 23rd.

Lycæna icarus (*Polyommatus alexis*).—The only blue yet observed, and it is natural that it should be a species that is not fastidious as regards soil. Notwithstanding the rich tiling of many species, perhaps this catches the observer's eye as well as any. Assuming this is my only blue, it may be seen as far distant as any, the colours blue and green naturally contrasting

so well, so naturally is the colour of the upper regions reflected in this butterfly. It may be seen on the wing in June, but the latter brood is the more abundant, usually occurring most in August, continuing into fine Septembers. I saw more of it in 1887 than in the last three seasons together. Unobserved in preliminary stages.

1888: June 21st—28th. 1889: August 30th—September 14th. 1890: June 2nd—September 15th.

Hesperia sylvanus (*Pamphila sylvanus*).—Like the last, the only representative of its tribe. This butterfly occurs regularly in June, being often seen in a certain spot. Contrary to most species, it is far more plentiful in the first than in the second emergence, being most frequent during June. The flights of this insect are short, the so-called skipping very rapid during bright sunshine, in duller weather less active. One dull morning, after rain had fallen, I caught a specimen with the finger and thumb, as it was settled upon a reed. This insect does not linger at all late in the season; I have not known it to extend to September. Unobserved in preliminary stages.

1888: June 16th—August 21st. 1889: June 22nd—August 1st. 1890: June 16th—July 24th.

Nordelph, Downham Market, Norfolk, Nov. 5, 1890.

COLLECTING IN WALES.

By J. ARKLE.

FOR those who are high-minded let me prescribe much riding on Welsh railways. Whether you shoot along the stone heaps beyond Bala, or touch the edge of the sea-cliffs at Barmouth, or screw round a mountain on the "narrow guage," the moral is the same—you are as helpless, and, let us hope, as humble, as the two-year-old who possibly shares with you the compartment. There is nothing to be seen out of window to make you rise in your own estimation. You are immediately shot across a gaping glen or rocky chasm, and the sight of a foxglove, with its possible *Eupithecia pulchellata*, only intensifies the idea that you are done with all things sublunary. And yet accidents are just as rare as on other lines, nor are the insurance rates higher. With such philosophies the time went by until the sight of a smart groom and turn-out, at Maentwrog, suggested I might change the scene, and recollect that the business on hand was moths and not morals. Away and along the highway we rolled, and, after picking up my host, Mr. W. J. Kerr, who pointed to the scorched-looking oaks nearly defoliated by swarms of *Tortrix viridana*, the evening of July 14th found me once more among the leafy shades of Tan-y-Bwlch (*Under the Hill*), and by the waters of Glan

William. The weather, which had marked the whole of the summer, was about as wet and cold as a summer could be, but we began without loss of time our raid upon the insects. The evening was so wet that we confined our operations to the garden, where we found *Apamea basilinea*, *A. oculatea*, *Metrocampa margaritaria*, *Abraxas grossulariata*, *Camptogramma bilineata*, *Hypena proboscidalis*, and *Zanclognatha grisealis (nemoralis)*.

July 15th.—A fine, warm, sunny day, and we made the most of it. Merionethshire is a land of fritillaries, but, as everyone knows, these butterflies have their haunts. It was too early in the season for *Argynnis paphia*, but, in an opening in the wood among the Plas grounds, and near the lake, we netted *A. selene* (worn) and *A. adippe*, also *Epinephele ianira*, and, by beating, *Melanthia ocellata*. A fine dark brown dragonfly, with yellow spots and stripes (*Æschia pratensis*), was also taken, but unfortunately the colours of this insect are not permanent, and soon fade after setting. The afternoon was spent on the heath-, fern-, birch-, and oak-covered slopes, which border the ascent to the celebrated Black Falls. All along *A. aglaia* and *A. adippe*—apparently fresh from the chrysalis—were common; we took a number of each species. *Anaitis plagiata* often rose from the heathery banks, and beating about among the tall ferns produced *Angerona prunaria*. *E. ianira*, a sort of robin redbreast among butterflies,—for few care to molest it,—was a frequent visitor, and pursued its meditative flight undisturbed. A fine dragonfly, *Libellula cærulescens*, rose from the bank, and was promptly stopped. The following is a description:—Head and thorax dark brown, with the usual couple of yellow frontal stripes, and couple of dorsal yellow spots, colours not permanent; body ample, plum-coloured blue, colours permanent, length $1\frac{1}{2}$ in., segments with black divisions; wings transparent, nervures black, expanse $2\frac{1}{2}$ inches. I see from my notes that the afternoon list ends with *C. bilineata*, and that its profusion was fearful and wonderful. Evening found us on the Festiniog road watching the honeysuckle bloom on the hedges for a late *Chærocampa porcellus* or *C. elpenor*. We were unsuccessful, although this is a favourite haunt for both insects. Our captures were *Uropteryx sambucaria*, *Rumia luteolata (cratægata)*, *Boarmia repandata* (exceptionally large and light-coloured), *Acidalia aversata*, *Abraxas grossulariata*, *Hypsipetes sordidata (elutata, variable as usual)*, *Cidaria populata*, *Eubolia limitata (mensuraria)*, *Phalera bucephala*, *Noctua plecta*, *Triphæna pronuba*, *Aplecta nebulosa* (all very light forms), *Cucullia umbratica* (common), *Plusia iota*, *Caradrina cubicularis*, and *Aphomia colonella*.

July 16th.—A fine morning, spent in setting. We started in the afternoon for the Black Falls, taking on our way *Dictyopteryx bergmanniana* and *Coccyx ustomaculana*. A deluge of rain compelled us to return home, where we arrived wet through. The

evening was a damp one; but we turned out, and netted *Cabera pusaria*, *M. margaritaria*, *Thyatira batis*, *Hydræcia nictitans*, *Agrotis exclamationis*, *Bromolocha fontis* (*crassalis*), and *Hypena proboscidalis*. At sugar we had poor luck, meeting only our old friends *Xylophasia monoglypha* (*polyodon*), *T. pronuba*, *A. exclamationis*, *T. batis*, and *Cidaria truncata* (*russata*). I boxed a female glow-worm, *Lampyris noctiluca*, as it brilliantly lit up an inch of grass in the wood.

July 17th.—A fine, warm, but sunless day. Mr. Kerr and I drove to Penrhyndeudraeth, a distance of eight miles. The nearest approach I can make to this formidable word is Pen-rindy-dreth. Like other Welsh names it is singularly descriptive, and means *the headland between the two estuaries*. There we started by train for a week's collecting at Aberdovey, a little town of a thousand inhabitants, half-way along the shores of Cardigan Bay, and, as the name implies, at the mouth of the Dovey. Parallel with the north shore of the estuary, and running away east and behind the town, is a range of heights some 300 feet above the sea-level. In the neighbourhood of the town these hills are covered with grass, furze, and fern, and are said to be a locality for *Lycæna arion*. As the heights run inland they are covered with a luxuriant growth of native oak, and midway between Aberdovey and Glandovey Junction they descend, within a few hundred yards of the estuary, in woody valleys meeting round a common centre. Here lies some of the finest scenery imaginable, and here lay our best butterfly ground. We reached Aberdovey, *viâ* Barmouth, at noon, and operations began at once by the discovery of *Dianthæcia* larvæ in the seed-pods of bladder campion growing about the railway-station. These caterpillars we made out to be *D. carpophaga* and *D. capsophila*. They pupated after I returned to Chester, before the end of the month. After lunch at the Dovey Hotel we turned out to secure quarters, and noticed on our way specimens of *Bryophila perla* at rest upon the walls. Our first attempt at securing lodgings was a failure, owing to the landlady taking alarm at our demand to be out at all hours of the night. This, coupled with a statement that our business was "moths," brought upon us expulsion. However, at No. 1, Bodfor Terrace, we triumphed in the surrender of a latch-key, and there we spent as happy, as homely, and as comfortable a week as could fall to the lot of humanity. The list for the afternoon is as follows:—Larvæ of *Bombyx rubi*; *C. umbratica* at rest; by beating brambles, St. John's wort, &c., *Hemithea strigata* (*thymiaria*), *Emmelesia decolorata*, *Eupithecia subfulvata* var. *oxydata*, *E. linariata*, *E. exigua*, *E. pumilata* (plentiful), *Mimæseophilus plagiodactylus*, *M. ocellata*, *Acidalia bisetata*, *A. marginepunctata* (*promutata*), *Cidaria pyraliata*, *Pelurga comitata*, and *Scoparia mercurialis*.

A bottle of rum, a lantern, a treacle-pot and a blacking brush

are not common ornaments to a sea-side costume, and our hostess viewed these auxiliaries in the art of fascination with some curiosity. Every evening we sallied forth with these additions to our personal appearance. We had two sugaring grounds, and they had the advantage of being near at hand. No. 1 began at the large white hotel, a few hundred yards away on the road to the railway-station, and occupied some years ago by a religious community, but since untenanted. The deep silent doorways of this lonely building were convenient shelters in the rain, until we were informed we were upon forbidden ground. Every succeeding night a sentry was placed upon the premises, and the occasional step we heard through the darkness showed—as they harmoniously sing in ‘The Yeoman of the Guard’—“He kept his solemn watch and ward.” From this hotel, along the road at the base of the hills, we sugared everything,—gates, posts, rocks and plants. Our second ground was the sand-hills, only a couple of hundred yards off, and near the sea. Here a line of posts in the fence beyond the railway provided every accommodation for the treacle. The sand-hills are not equal to those of Wallasey. A suspicious-looking mark looks as if much of the ground lay under water in the spring tides. Still there is plenty of vegetation,—the trefoils, the bedstraws, mullein, fennel, and maritime grass. Farther away, a marsh lies between the sand-hills and the road, with any amount of water-dock, sedge, and willow. Flowers there were, and fit to adorn any garden:—the viper’s bugloss, with its host of purple and pink blossoms; the sea thistle, with its prickly, pale, pea-green leaves and sky-blue flower-balls; and groves of the tall evening primrose, with its large yellow blooms open to the night. We tried the latter at dusk to see if *Deilephila galii* would turn up, but we only netted *X. monoglypha* and *Miana bicoloria* (*furuncula*). The night was warm, dark, and threatening for rain. It was now time to examine the sugar, and we found moths in swarms at it. I never saw anything to equal our success. *X. monoglypha*, in hundreds, showed several beautiful varieties,—the finest, a very light-coloured example, with markings almost black, being now in the collection of Mr. Kerr. The next insect in point of numbers was *Hadena oleracea*, and it was equally conspicuous for variation. *Triphaena pronuba*, *T. orbona*, *Leucania lithargyria*, *L. conigera*, *X. lithoxylea*, came next. We also took several specimens of *Mamestra albicolon* and *M. persicariæ*, *Caradrina blanda*, *Nonagria fulva*, and light and dark varieties of *Agrotis segetum*. The following are our additional lists at sugar:—

July 18th.—Warm, wet day, with night showers. *Thyatira derasa*, *Cerigo matura* (*cytherea*), *M. bicoloria* (*furuncula*), *Agrotis lunigera*, *A. corticea*; *X. monoglypha* and *H. oleracea* (nuisances); *L. conigera* (fine varieties), *L. lithargyria*, *L. pallens*, *Noctua*

plecta, *Hydræcia nictitans* (all sorts of varieties from the lightest to darkest), *T. orbona* and *T. pronuba*.

July 19th.—Warm, moist. *Acronycta rumicis* (plentiful, beautiful varieties), *Mamestra abjecta*, *Noctua baia*, *N. festiva*, *Hadena contigua* (common), *H. pisi*, *H. adusta*, *A. lunigera* (common), *T. derasa*, *C. matura* (*cytherea*, common), *M. bicoloria* (*furuncula*), *Apamea basilinea*, *Caradrina quadripunctata* (*cubicularis*), and, at light, *Plusia chrysitis*.

July 20th.—Still warm and damp. A similar list, with the addition of *T. interjecta*. Netted *Nudaria mundana*, *C. fulvata*, *Aphomia sociella* (*colonella*), and *Hyponomeuta padellus*. We frequently saw *T. interjecta* at dusk, and as frequently missed it, owing to its partiality for bramble protection. Its russet colour was unmistakable. *C. bilineata*, as usual, added very materially to our netting exertions.

July 21st.—Dry, temperature lower. *Botys ruralis* (*verticalis*), *L. conigera*, *L. littoralis*, *A. lunigera*, *C. matura* (*cytherea*), *Euplexia lucipara*, *H. contigua*, *H. trifolii* (*chenopodii*, worn), and *H. nictitans*.

July 22nd.—Blew half a gale from the N.W. Dry, much colder. *X. monoglypha* only by the dozen; a few *X. lithoxylea*, *H. nictitans*, *A. exclamationis*, four specimens of *C. matura* (*cytherea*), one *M. albicolon*, one *M. literosa*, and a few *L. lithargyria* and *L. pallens*.

July 24th.—A cold, dry evening. Poor results. A few *X. monoglypha*, *X. lithoxylea*, *T. pronuba*, *T. ianthina*, *H. pisi*, *H. oleracea*, and *H. nictitans*. The last-mentioned was always very variable. The following are our diurnal records:—

July 18th.—A wet day, devoted to setting.

July 19th.—Warm and sunny. Went to the oak woods on the heights between Aberdovey and Glandovey Junction. On our right we had the sea, or rather estuary; on our left, wooded slopes, with occasional clearings green with fern or purple with blossoming heather, bosky dells, and shady delicious streams. Netted *A. selene* (worn), *A. aglaia*, *A. adippe*, and *A. paphia* (the three last abundant). *A. paphia* was evidently in quest of partners for its brief joys. Its flight was swift and vigorous, and rarely interrupted by bramble or other blossoms. Its capture was consequently warm work. *Satyrus semele*, *E. ianira*, *E. tithonus*, *E. hyperanthes*, *Cænonympha pamphilus*, *Polyommatus phlœas*, *Hesperia sylvanus*, and *Lycæna icarus* (*alexis*) were also common. Saw several suspicious-looking "blues," but failed to net them owing to the difficult ground. Other butterflies:—*Pieris brassicæ*, *P. rapæ* and *P. napi*. Two yellow beetles with black markings were captured,—*Strangalia armata*. We also took *Calopteryx virgo*, a dragonfly with head, thorax, and body bright iridescent green; wings deep iridescent peacock-blue; tips of wings smoky, but transparent; colours permanent; expanse of

wings $2\frac{1}{4}$ inches; length of body $1\frac{3}{4}$ inches. On our return, the heath on the hill-sides produced *Zygæna filipendulæ*, *Pyrausta ostrinalis*, and the rose-coloured *Endotricha flammealis*—all abundant insects. As usual, and throughout our stay, we took *A. promutata* (at rest on the rocks) and the *Eupithecia* already quoted.

July 20th.—Fine; neighbourhood close to Aberdovey. Additional insects:—*Lomaspilis marginata*, *Schœnobiæ forficellus*, *Crambus perlellus*.

July 21st.—Warm, sunny at intervals. Locality as on the 19th. Additional insects:—*Sesia bembeciformis*, a fine specimen taken from the tops of willow; *Bombyx quercus*; *Panagra petrarica*, from a bog close to Glandovey Junction, and amongst a herd of long-horned cattle (this exhibition was a gratis one to a trainful of people bound for Aberystwith). Larvæ of *Arctia menthastri*, just hatched, were also taken from a willow-leaf almost at the top of a bush. On the railway-embankment tangled masses of the wild everlasting pea, with its familiar pink blossoms, grew luxuriantly.

July 22nd.—Went inland across the hills behind Aberdovey, and doubled round to the road home. On the plateau, about 300 feet above the sea, we came upon a large area with a profuse growth of big wild pansies amongst the short grass. There were two varieties, violet and yellow, and an obvious cross with the upper petals violet and the lower ones yellow. Additional insects:—*Vanessa urticæ*, *B. gemmaria* (*rhomboidaria*), *Pseudoterpna pruinata* (*cytisaria*), *A. aversata* var. *lividata*, *Larentia viridaria* (*pectinitaria*), *Tanagra atrata* (*chærophyllata*), *Crambus culmellus*, and the brown *Aspis udmanniana*, with its staring chocolate spot on each upper wing. We also captured a dragon-fly. The latter insect is of a uniform but iridescent brown, with a pale costal spot near the tip of each wing. The head, thorax, and body, however, show indications of the glorious tints which adorn *Calopteryx virgo*, and its identity is still further apparent in matters relative to size and shape.

July 23rd.—A cold, sunless day, with a breeze from the N.W. Additional insects:—*Liparis similis* (*auriflua*) and *Cabera exanthemaria*.

July 24th.—A fine day. We counted five or six varieties of wild geranium, including the rare deep pink *G. sanguineum*, close to Aberdovey. Returned to Tan-y-Bwlch: here we found that *A. paphia*, *Thecla quercus* and *Larentia olivata*—all abundant insects in their season—were so late as to be not even yet on the wing. Sugared in the evening. Our Aberdovey experience showed that the cool dry night was the cause of a poor result.

Next day, July 25th, I determined to have a look at Abersoch, a few miles by coach from Pwllheli, and on the north shores of Cardigan Bay. It will be remembered (see 'Entomologist' for

August, 1887, and August, 1889) that—thanks to Messrs. L. L. Samuels and C. Oldham—*Zygæna pilosellæ* (minos) turned up at Abersoch in the years above mentioned. Although the insect appears to be due in the second week of June, I decided that a visit might result in the capture of a late specimen, or in the establishment of such relations with the neighbourhood as would enable me to secure a series of this rare and beautiful moth. Amidst much regret that I could not have the company of my kind host, I was driven again to Penrhyndeudraeth, and from thence by train to Pwllheli. I was surprised to find Pwllheli—figuratively speaking at the end of the world—such a smart-looking town. There are good hotels,—one I can answer for, ‘The Crown,’ and from this hostelry a trap runs in connection with the morning train to Abersoch. The regular conveyance had been requisitioned by a lot of school children for a day’s outing; but, in lieu of this, I was introduced to a Welsh car. This is a low, circular vehicle, on four wheels, with a chair-like seat high up in front for the driver. The turn-out included a big, spanking horse, and conjured up, in due chronological order, visions of Jehu, the war-chariot of the ancient Britons, and the modern reaping-machine. Wishing the youngsters a pleasant day, away we went in bright sunshine, and I whiled away the time by eyeing the long rows of willows on each side of the road—an occupation ever and anon interrupted by the jerks and efforts of our quadruped to shoot me out at the rear of the trap. On reaching Abersoch I was speedily on “the sunny slopes above the cliffs,” but only to find that I was three or four weeks too late for my insect. *V. urticæ*, *S. semele*, *E. ianira*, *E. tithonus*, *C. pamphilus*, *L. icarus* (alexis), *Z. filipendulæ*, and *P. petrarria* were abundant. Sticking to the bents of the maritime grass, and close to the sea, were thousands of the pretty spiral land shell, *Bulinus acutus*. At our hotel I was shown what had been a fine specimen of *Acherontia atropos*. It flew in through the open window; and I was informed the moth was not at all unusual,—a matter perhaps explained by the numerous potato patches on the hill-sides. I did not leave the village until I had every reason to hope for a series of *Z. pilosellæ* from the cliffs next season. I got back to Pwllheli (*Pool-tell-he* will do for an Englishman) wet through; but as I had long since graduated—taking the degree *Amphibious*—the matter was a small one. I reached Tan-y-Bwlch in the evening, and a chat over the events of the day brought to a close our long and enjoyable insect raid.

Chester, October, 1890.

A PRELIMINARY LIST OF THE INSECT-FAUNA OF MIDDLESEX.

COMPILED BY T. D. A. COCKERELL.

DURING the past few years Mr. F. G. Fenn has had in hand the preparation of a list of the insects of Isleworth, and now that he has removed to London he has kindly given me permission to prepare his records for publication. While doing so, it seemed advantageous to gather together various unpublished records of Middlesex insects which I had in hand, and to publish the whole as a contribution to the fauna of the county. I at first intended to group the species under the localities; but it was represented to me that a systematic list, with the localities given for each species in order, would be more useful, and I have adopted this arrangement. I should have liked to make it a complete list of all the known Middlesex insects, but the labour of compilation from all the published papers on the subject is more than I can at present find time to attempt, and I am obliged to leave it only as complete as circumstances permit. I shall quote published records only when I have the species recorded in no other way, and shall only give one published record as a rule for each such species, though there may be more existing; that is to say, I shall make the list of species as complete as possible, but shall not repeat numerous already-recorded localities.

Species recorded from London will be included, as Middlesex will be understood in the old sense, thus including the greater part of London. Species recorded from "near London" and "London district" will be omitted, as these are in most cases not Middlesex records. Everything will be included, common or rare; but after this preliminary list has been completed, species additional to it will be found from time to time, and it is hoped that before long our Middlesex insect-fauna will be so complete that any addition will be regarded as of importance.

The compiler is responsible for the nomenclature adopted throughout. Myriapoda and Arachnida will be included.

As far as possible the collector of each species will be given proper credit; if the collector and recorder are not the same, the names of both will be given, as "*Jones fide Robinson.*" When only one name is given, it is always the recorder, but usually in such cases he is also the collector.

The compiler will be exceedingly indebted to any entomologists having Middlesex records, if they will send them to him to be included in the present list. Records of the less-known orders will be specially valued. The following are the chief sources of information at present available:—

(1.) F. G. Fenn. A MS. list of the insects of Isleworth, taken during the years 1887—1889. Assistance was given in identifications by the following entomologists:—Mr. W. West,

Coleoptera, 32 spp.; Mr. E. Saunders, Hymenoptera, 38 spp., and Hemiptera, 10 spp.; Mr. E. A. Fitch, Hymenoptera, 4 spp.; Mr. J. W. Tutt, Lepidoptera, 19 spp.; Mr. G. H. Verrall, Diptera, 7 spp.; Mr. E. Brunetti, Diptera, 25 spp.; Rev. O. P. Cambridge, Arachnida, 28 spp.; and a few others.

(2.) A MS. list of the insects of Bedford Park, Chiswick, taken during the years 1885—1890. By T. D. A. Cockerell, with addenda by F. G. Fenn. The following entomologists have kindly assisted with identifications:—Mr. E. Saunders, Coleoptera, 14 spp, Hymenoptera, 21 spp., and Hemiptera, 7 spp.; Mr. McLachlan, Neuroptera, 6 spp.; Mr. J. W. Tutt, Lepidoptera, 15 spp.; Mr. R. South, Lepidoptera, 3 spp.; Mr. R. H. Meade, Diptera, 15 spp.; Rev. O. P. Cambridge, Arachnida, 20 spp.; and some others.

(3.) Louis B. Prout. A MS. list of Lepidoptera, taken chiefly at Dalston.

(4.) R. South. A MS. list of Lepidoptera, taken at Mill Hill. "Taking the station on the Midland Railway as a centre, a radius of one mile will give the entire ground worked. The garden mentioned in the list belongs to J. Marshall, Esq."

(5.) F. Godwin. A MS. list of Lepidoptera of North and West London, taken during the years 1872—1875. Communicated by Mr. R. South.

(6.) F. Smith, 'Catalogue of British Hymenoptera in the Collection of the British Museum,' 1855.

(7.) 'The Entomologist,' vols. i.—xxiii.

(8.) 'The Entomologist's Monthly Magazine,' vols. i.—xxvi.

HYMENOPTERA.

Formicidæ.

Formica fusca var. *cunicularia*, Latr., Hampstead (Smith).

Lasius niger, Linn., Bedford Park (Ckll.), Isleworth (Fenn).

L. flavus, DeGeer, Bedford Park (Ckll.).

Tapinoma gracilescens, Nyl., London City (W. W. Fowler, E. M. M. 1885, p. 276).

Myrmicidæ.

Myrmica rubra var. *ruginodis*, Nyl., Isleworth (Fenn), Bedford Park (Ckll.).

Monomorium pharaonis, Linn., London (Bellevoye).

Pheidole megacephala, F., Hampstead (Smith).

Mutillidæ.

Myrmosa melanocephala, Fab., Hampstead (Smith).

Methoca ichneuonides, Latr., Hampstead Heath (Smith).

Scoliidæ.

Tiphia minuta, V. d. Lind., Hampstead Heath (Smith).

(To be continued).

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. PERRY COSTE, F.C.S.

(Continued from p. 343).

V.—THE CHEMICAL ASPECT (*continued*).

E.

PERHAPS before entering into details concerning yellow, which is our first pigment colour, I ought to justify an assumption that has been made from the outset concerning the changes wrought in *all* the colours experimented on,—*viz.*, that the transformation effected by my reagents is uniformly and invariably *retrogressive*; that in no instance has a progressive modification been effected,—for the apparent exception of *Melanargia galatea* has already been explained, and shown to be no exception at all. The justification of this assumption I feel to be important, since to *disprove* it were to pretty nearly demolish the entire fabric of theory and explanation that I have built upon my experimental data. And yet to say truth, when I first set myself to give a formal demonstration of this fundamental principle, I felt somewhat nonplussed. The evidence for it is so essentially of a *cumulative* character that it would be far easier simply to call attention to the assumption, and then leave it to be justified by the whole mass of experiments, and its reasonableness shown by the satisfactory results yielded by inferences drawn from it. As a matter of fact, this conception of the character of my experimental results has grown up almost irresistibly in my mind during the progress of my experiments, and has seemed to me throughout a matter of course. But it is evidently impossible that my readers, by merely reading of experiments, should evolve the same mental conviction that has gradually grown up in myself: some more formal justification must be offered to them; and I was really somewhat taken aback when it occurred to me to ask myself how I should justify to others a conviction founded on experience that is naturally *incommunicable*. At any rate, however, it behoves me to try what account can be rendered.

I think, then, that I should base my case primarily and especially on the behaviour of reds. It is universally admitted, I suppose, that red is developed through orange from yellow; the very stages almost may be seen in some species, as *Arctia caia* and *Catocala nupta*, in which species the deep red of the wing shades off into a very pale colour where it is overlapped by the fore wing. Moreover, as previously pointed out, *A. caia* and *Vanessa atalanta*, when first emerged, are often rather of an orange than a red colour, the colour deepening in a day or two. This evolution of red from yellow and orange is not confined to insects; everyone may easily satisfy himself by observing the

progressive colour-changes which go on as many fruits ripen, and in many leaves towards autumn, that the evolution of red from yellow is emphatically the rule. I hardly think that this will be disputed: very well then; in every experiment, without exception, in which red or pink was changed by my reagents (and red species in every group of Macro-Lepidoptera have been tested), it was invariably changed to orange and yellow, or in one or two cases to the closely allied chestnut. Here, even if we went no further, is a most substantial base from which to argue that such changes as these reagents produce are always retrogressive. But other instances may be quoted. Everyone knows that the orange of *Euchloë* is a comparatively recent development on an otherwise white species*: very well; then it is clear that, in dissolving out this colour and leaving the wing white, as it originally was, I have effected a retrogressive change. In fact, it appears to me self-evident that in all cases in which a colour has been *dissolved* out a retrogressive change has been effected; but I refrain from relying on this as a proof lest possibly some readers may not incline to admit so much. Next we may take such a case as *Thecla rubi*. It will undoubtedly be admitted that the green on the lower side of the hind wings has been developed as a protective resemblance to the foliage: this green is changed by every reagent to the brown colour displayed by all the rest of the wings; what better instance of a retrogressive metamorphosis? Finally, since we must assume that the uncommon and beautiful blue of *Lycænidæ* has been developed (*why* we don't know, unless Darwin's theory of Sexual Selection be adopted) from the dull colours of primeval *Lycænidæ*, it must be admitted that the abolition of this by the reagents is also a retrogressive change.† I hope now to have made it clear that the whole weight of the evidence—where it can be checked by admitted entomological facts—supports my assumption that these changes are in every case retrogressive. For the contrary assumption (if it should be made in any case where we have only the chemical evidence to go upon) there is *no direct evidence* from Entomology whatever, and such an assumption can only involve the whole issue in confusion and contradiction. Here, then, I quit the subject, leaving the arguments just instanced to be borne out by the general character of the results obtained by arguing upon this assumption.

In the next place it will be as well, perhaps, if I draw attention here to an important fact that concerns all the colours generally rather than any one group especially; and will therefore be

* Cf. Darwin's 'Descent of Man,' chap. 11.

† I am afraid, however, that the validity of this last argument will be denied by any who hold, with Wallace, that the bright colours of males are the originals, and the dull colours of females the derivatives. But, at any rate, the argument from red and yellow is irrefragable; and on the strength of this alone it would be legitimate, arguing from analogy, to hold that all the changes were retrogressive,—at least until any could be directly proved otherwise.

more fitly pointed out now than later, when any specific colours are being discussed. The importance of this fact to a right understanding of the experiments can hardly be over-estimated; but unfortunately it is one to whose importance I was not alive until I had been working some time. Reagents may affect pigment colours in one of two ways:—they may dissolve out the pigment, or they may simply alter it. The former action occurs with probably all chestnuts and yellows that are affected at all, and with some greens; the latter, with all reds without exception, with many greens, and with some blues. The distinction is very important, since, whilst dissolved colours can, obviously, never be restored, those *which are* merely altered may, in a large number of cases at any rate, *be restored*, by appropriate methods, *to their original appearance*.* This will, I think, be acknowledged to be sufficiently startling. It was a long time before I grasped these principles in their full extent; and then it not unnaturally appeared to me that *every* colour change, when not due to dissolution, might be reversed, and the original colour so reproduced. That this is the case,

however, I find cannot be maintained, although (at least for the present) I do not wish to absolutely deny its possibility. Neither, on the other hand, would I wish to be understood as asserting that in every “reversible” colour change *no* solution of pigment takes place. On the contrary, I am inclined to think it at least very possible that in most cases a *slight* solution may take place; at any rate I do not believe that the most “reversible” colour could be altered and reversed, and so on, backwards and forwards, an indefinite number of times; certainly I believe that the colour would gradually fade away in such a case. I very much regret not being able to speak with more certainty on this matter, but, as I have already said, it was only late in the day that I discovered these facts: had I known of them earlier—known *what to observe*—it is possible that I might have found a *solution effect* produced in cases where, as a matter of fact, I have not noticed any such.

One characteristic difference I ought to add:—a solution effect *may* be produced very rapidly in some cases, but still the time element is always present; an alteration effect, whether reversible or not, is in most instances (in *all* with the fittest reagents) *instantaneous*.

F.

The two colours next to be considered—yellow and red—are by far the most interesting of all,—that is, so far as concerns these experiments: and they are so closely related, and a consideration of the behaviour of either so indispensable to a proper understanding of that of the other, that we shall do better to examine them simultaneously rather than observe the formality

* An extensive set of additional experiments on this question will be detailed in its proper place.

of giving each a separate handling: for indeed, whilst red, both logically and historically, follows yellow, yet it is impossible to fully discuss the phenomena of yellow without constant reference to red. I may add that in no group of colours is there more temptation—and even necessity—for speculation and hypothesis than in this: and in no part of my work have I had so many warnings of the dangers attendant on too speedy generalisation and the necessity for circumspection. It is fortunate that the colours which most especially tempt one to such dangers should at the same time preach the most emphatically against the rashness which they provoke.

Referring now to the tables on pp. 248, 249, what do we find as the general results? As to red (omitting the cases of one or two species, as *Vanessa atalanta* and *V. cardui*, which can be better explained after dealing with chestnut), we have a singular unanimity, as interesting as important, and can lay down the very general law* that chemical reagents *change red to yellow*; or, translating this from the language of empirical facts into that of theory,† that red is retrogressively modified into yellow—from which it was originally developed. In the species experimented upon we have every subdivision of the Macro-Lepidoptera represented, and it appears to me an exceedingly interesting fact that red is chemically always one and the same colour, however different in superficial appearance,‡ and however far apart phylogenetically be the species thus adorned: red is one and the same in the Rhopalocera, Sphinges, Bombyces, Noctuæ, and Geometræ.§

We have therefore this general result: that by the action of chemical reagents|| red is instantly changed to yellow, *but there the change stops*; and by no means can this yellow so produced be altered or affected in any way. Here we find ourselves at once face to face with the problem of the character of the yellow pigment, and to a consideration of that we must turn before we can proceed further with red.

Again referring to the table on p. 248, what do we find is the

* I omit altogether any reference to *Papilio machaon*, since the colour here—as evidenced even by its superficial appearance—is not a true red. Any significance that might be attached to this one species, as typical of the Papilionidæ, is entirely destroyed by the fact that in species of tropical Papilios sent me (e.g., *P. hector*, marked with brilliant vermilion) red is instantly changed to yellow, as in all other groups.

† See pp. 370, 371.

‡ As exemplified, e.g., by the pink of *Deiopeia* and Sphinges, the scarlet of *Parnassius apollo*, the brilliant reds of Bombyces, and the unhealthy reddish of *Xanthia*.

§ Red being so rare a colour in Geometræ, I was exceedingly anxious to ascertain whether red Geometræ would behave as all other red species; and it was with considerable interest that I examined the two species, *Hyria auroraria* and *Acidalia rubricata*, kindly sent me by several correspondents. These species will again be alluded to in another section.

|| Note that red is far more sensitive to acids than to alkalies.

general conclusion to be drawn from the experiments on yellow? Having found red always the same, wherever displayed, can we lay down an equally general law as to yellow? are all yellows one and the same? Apparently *no*! very far from it: we find, on the contrary, the most different and contradictory results, and seem almost driven to conclude that under the common name of yellow there are confused together several entirely different colours, including both true pigment colours and mere "physical" colours. But this latter assumption, as I have already pointed out,* may be considered almost completely negated by the arguments deducible from the results yielded by red; and further evidence from the comparative study of allied yellow species will be found in the present section.

[Want of space compels us to hold over the remainder of this subsection until next month.—E.D.]

(To be continued.)

Erratum.—Page 312, line 20, for "my" read "any."

LIST OF INSECTS TAKEN IN THE FAROE AND WESTMANN ISLES, AND IN ICELAND, 1890.

By F. A. WALKER, D.D., F.L.S.

COLEOPTERA.

FAROE ISLES.

THORSHAVN.—June 9th, *Nebria brevicollis*, *Calathus cisteloides*, *Patrobus hyperboreus*, *Cryptohypnus riparius*, *Tachinus rufipes*.

KLAKSVIG.—June 10th, *Nebria brevicollis*, *N. gyllenhali*, *Patrobus hyperboreus*, *Carabus catenulatus*, *Quedius fuliginosus*, *Otiorhynchus scabrosus*.

WESTMANN ISLES.

HEIMAËY.—June 12th, *Otiorhynchus monticola*, *Barynotus schonherri*, *Nebria gyllenhali*, *Calathus melanocephalus* var. *nubigena*, *Cryptohypnus riparius*, *Notiophilus bipustulatus*, *Creophilus maxillosus*, *Platysma vitreus*, *Byrrhus fasciatus*, *Amara quenselii*, *Aphodius lapponum*, *Lesteva bicolor*, *Patrobus hyperboreus*, *Otiorhynchus* ———?

REYKJAVIK.—June 13th, *Nebria gyllenhali*, *Philonthus æneus*, *Calathus melanocephalus* var. *nubigena*, *Otiorhynchus monticola*, *Amara quenselii*; June 14th, *Nebria gyllenhali*, *Barynotus schonherri*, *Calathus melanocephalus* var. *nubigena*, *Otiorhynchus monticola*, *Patrobus hyperboreus*; June 15th, *Nebria gyllenhali*, *Aphodius lapponum*, *Otiorhynchus monticola*, *Calathus melanocephalus* var. *nubigena*.

ENGEY ISLAND.—June 14th, *Nebria gyllenhali*, *Cryptohypnus riparius*, *Calathus melanocephalus* var. *nubigena*, *Patrobus hyperboreus*, *Otiorhynchus monticola*.

* See pp. 310, 311.

FIRST VOYAGE ROUND ICELAND.

EAST COAST.—Berufjördr: June 17th, *Nebria gyllenhali*, *Patrobis hyperboreus*, *Otiorhynchus monticola*, *Notiophilus bipustulatus*, *Byrrhus fasciatus*. Seydisfjördr: June 18th, *Nebria gyllenhali*, *Aphodius lapponum*, *Byrrhus fasciatus*, *Otiorhynchus monticola*, *Barynotus schonherri*, *Tropiphorus mercurialis*, *Patrobis hyperboreus*, *Calathus melanocephalus* var. *nubigena*, *Platysma vitreus*.

NORTH COAST.—Akureyri: June 19th, *Nebria gyllenhali*, *Platysma vitreus*, *Amara quenselii*: June 20th, *Nebria gyllenhali*, *Amara quenselii*, *Otiorhynchus monticola*, *O.* ———?, *Cryptohypnus riparius*, *Byrrhus fasciatus*, *Calathus melanocephalus* var. *nubigena*, *Chrysomela staphylea*: June 21st, *Nebria gyllenhali*, *Patrobis hyperboreus*, *Cryptohypnus riparius*, *Creophilus maxillosus*, *Amara quenselii*, *Byrrhus fasciatus*, *Calathus melanocephalus* var. *nubigena*, *Otiorhynchus monticola*, *O. scabrosus*, *O.* ———? Saudarkrok: June 22nd, *Otiorhynchus monticola*.

WEST COAST.—Ísarijardr: June 23rd, *Agabus bipustulatus*, *Bradycellus cognatus*, *Nebria gyllenhali*. Onundafjördr: June 23rd, *Otiorhynchus monticola*, *Nebria gyllenhali*, *Amara quenselii*. Dyrafjördr: June 24th, *Nebria gyllenhali*. Patriksfjördr: June 24th, *Otiorhynchus monticola*, *Calathus melanocephalus* var. *nubigena*. Stykkisholmur: June 25th, *Nebria gyllenhali*, *Patrobis hyperboreus*, *Platysma vitreus*, *Byrrhus fasciatus*, *Cryptohypnus riparius*, *Notiophilus bipustulatus*, *Otiorhynchus monticola*, *Calathus melanocephalus* var. *nubigena*. Flatey Island: June 25th, *Nebria gyllenhali*, *Byrrhus fasciatus*, *Amara quenselii*, *Otiorhynchus monticola*, *Calathus melanocephalus* var. *nubigena*, *Bradycellus cognatus*, *Philonthus sordidus*. Reykjavik: June 26th, *Creophilus maxillosus*, *Nebria gyllenhali*, *Otiorhynchus monticola*, *Calathus melanocephalus* var. *nubigena*, *Cryptohypnus riparius*: June 28th, *Nebria gyllenhali*, *Platysma vitreus*, *Creophilus maxillosus*, *Patrobis hyperboreus*, *Amara quenselii*, *Otiorhynchus monticola*, *Barynotus schonherri*, *Calathus melanocephalus* var. *nubigena*: June 30th, *Nebria gyllenhali*, *Creophilus maxillosus*, *Patrobis hyperboreus*, *Amara quenselii*, *Otiorhynchus monticola*, *Barynotus schonherri*, *Calathus melanocephalus* var. *nubigena*: July 1st, *Nebria gyllenhali*, *Patrobis hyperboreus*, *Amara quenselii*, *Otiorhynchus monticola*, *Bembidium bipunctatum*, *Cryptohypnus riparius*, *Calathus melanocephalus* var. *nubigena*. Road to Hengill Mountain: June 27th, *Nebria gyllenhali*, *Patrobis hyperboreus*, *Calathus melanocephalus*, var. *nubigena*.

SECOND VOYAGE ROUND ICELAND.

WEST COAST.—Stykkisholmur: July 3rd, *Otiorhynchus monticola*, *Nebria gyllenhali*, *Amara quenselii*. Arnarfjördr: July 4th, *Otiorhynchus monticola*, *Nebria gyllenhali*, *Amara quenselii*, *Cryptohypnus riparius*, *Byrrhus fasciatus*, *Calathus melanocephalus* var. *nubigena*, *Patrobis hyperboreus*. Dyrafjördr: July 5th, *Otiorhynchus monticola*, *Nebria gyllenhali*, *Amara quenselii*.

NORTH COAST.—Siglufjördr: July 8th, *Nebria gyllenhali*, *Cryptohypnus riparius*, *Patrobis hyperboreus*, *Amara quenselii*. Akureyri: July 9th and 10th, *Nebria gyllenhali*, *Philonthus æneus*, *Aphodius lapponum*, *Patrobis hyperboreus*, *Amara quenselii*, *Otiorhynchus monticola*, *Calathus melanocephalus* var. *nubigena*. Husavik: July 11th, *Nebria*

gyllenhali, *Aphodius fœtidus*, *Amara quenselii*, *Calathus melanocephalus* var. *nubigena*.

EAST COAST.—Vopnafjörðr: July 12th, *Nebria gyllenhali*, *Cryptohypnus riparius*, *Amara quenselii*, *Otiorhynchus monticola*, *Calathus melanocephalus* var. *nubigena*. Seydisfjörðr: *Nebria gyllenhali*, *Amara quenselii*, *Cryptohypnus riparius*, *Calathus melanocephalus* var. *nubigena*. Eskefjörðr: July 18th, *Amara quenselii*, *Lesteva bicolor*, *Cryptohypnus riparius*, *Nebria gyllenhali*.

FAROE ISLES.

THORSHAVN.—July 15th, *Nebria brevicollis*, *Amara spinipes*, *Calathus melanocephalus* var. *nubigena*.

The three forms of *Calathus melanocephalus* were obtained in 1890, as follows:—

WESTMANN ISLES, June 12th, typical 7, var. *nubigena*, 13. Reykjavik, June 18th, typical 2, var. *nubigena* 2; June 14th, typical 3, intermediate 1, var. *nubigena* 3; June 15th, intermediate 4. Engey Island, June 14th, intermediate 10.

FIRST VOYAGE ROUND ICELAND.—Seydisfjörðr (E. coast), June 18th, typical 3, var. *nubigena* 2, intermediate 3. Akureyri (N. coast), June 19th, typical 1, var. *nubigena* 2; June 20th, typical 4, intermediate 4, var. *nubigena* 4. Patriksfjörðr (W. coast), June 24th, typical 2, intermediate 1. Stykkisholmur (W. coast), June 24th, typical 6, intermediate 3, var. *nubigena* 5. Flatey Island (W. coast), June 25th, intermediate 2, var. *nubigena* 7. Reykjavik, June 26th, var. *nubigena* 1; June 28th, intermediate 2, var. *nubigena* 3; June 30th, typical 4, intermediate 8, var. *nubigena* 14; July 1st, intermediate 2, var. *nubigena* 2. Road to Hengill Mountain, June 27th, typical 2, intermediate 1, var. *nubigena* 5.

SECOND VOYAGE ROUND ICELAND.—Arnarfjörðr (W. coast), July 4th, intermediate 5, var. *nubigena* 1. Akureyri (N. coast), July 10th, var. *nubigena* 3. Glárafoos (N. coast), July 10th, typical 1. Husavik (N. coast), July 11th, typical 2. Vopnafjörðr (E. coast), July 12th, intermediate 1. Seydisfjörðr (E. coast), typical 3, var. *nubigena* 1.

FAROES, July 15th, typical 1, var. *nubigena* 2.

Total of specimens, 158: typical, 41; intermediate, 47; var. *nubigena*, 70.

Calathus melanocephalus, as captured in 1889:—

Thingvellir, July and August, var. *nubigena* 2. Reykjavik, July, typical 2, intermediate 3, var. *nubigena* 1. Patriksfjörðr, July, intermediate 1. Onundafjörðr, July, var. *nubigena* 1. Saudarkrok, August, typical 1. Total 11: typical, 3; intermediate, 4; var. *nubigena*, 4.

In Staudinger's list of Iceland insects this species is termed *Calathus nubigena*, owing doubtless to the preponderance that he found there of that var., and to which he gave its name. In Paijkull's list of Iceland insects the species is termed *Carabus melanocephalus*.

DIPTERA.

Sarcophaga mortuorum: Westmann Isles, June 12th; Reykjavik, June 18th and 14th; Berufjörðr, June 17th; Seydisfjörðr, June 18th;

Akureyri, June 21st; Onundafjördr, June 23rd; Dyrafjördr, June 24th; Reykjavik, June 26th and 28th; Siglufjördr, July 8th; Akureyri, July 9th; Glárafoss, July 10th; Vopnafjördr, July 12th. *Helophilus pendulus*: Reykjavik, June 13th and 14th, 28th and 30th, July 1st and 2nd; Akureyri, July 9th and 10th. *Sericomyia lappona*: Reykjavik, July 2nd. *Scatophaga litorea*: Engey Island, June 14th. *Fucellia fucorum*: Akureyri, June 21st; Husavik, July 11th. *Platycheirus albimanus*: Seydisfjördr, June 18th. *Scatella stagnalis*: Reykjavik, July 2nd. *Chironomus tibialis*: Reykjavik, June 13th and 14th. *Scatophaga stercoraria* and *Calliphora erythrocephala*: common everywhere. *Tipula confusa*: Westmann Isles, June 12th; Reykjavik, June 13th and 14th; Berufjördr, June 17th; Seydisfjördr, June 18th; Isafjördr, June 23rd; Arnarfjördr, July 4th; Engey Island, June 14th. *T. lunata*: Thorshavn, June 9th; Reykjavik, June 13th and 14th. *T. oleracea*: Thorshavn, June 9th and July 15th.

HYMENOPTERA.

Ichneumon luctatorius: Westmann Islands, June 12th, one specimen; Reykjavik, June 13th and 30th, one; Road to Hengill Mountain, June 27th, one. *I. vaginatorius*: Akureyri, July 9th, three. *Pimpla aterrima*: Stykkisholmur, June 25th, one; Husavik, July 11th, one. *Alysia manducator*: Husavik, July 11th, ten. *Bombus terrestris*: Akureyri, July 9th, one; Glárafoss, July 10th, one.

LEPIDOPTERA-HETEROCERA.

FAROE ISLES.—Thorshavn: *Charæas graminis* (from chrysalis), June 9th; *Coremia munitata*, June 9th; *C. propugnata*, June 9th; *Crymodes exulis*, June 9th; *Aphelia osseana* (= *pratana*), July 15th.

ICELAND. — *Caradrina cubicularis*: Onundafjördr, June 23rd; *Charæas graminis*: Akureyri, July 9th and 10th. *Crymodes exulis*: Stykkisholmur, June 25th; Reykjavik, June 26th; Road to Hengill Mountain, June 27th; Siglufjördr, July 8th; Akureyri, June 20th, July 9th and 10th; Dyrefjördr, July 5th. *Noctua conflua*: Road to Hengill Mountain, June 27th; Akureyri, July 9th and 10th. *Hadena contigua*?: Road to Hengill Mountain, June 27th; Akureyri, June or July. *Coremia munitata*: Reykjavik, June 26th and 28th; Engey, June 14th; Stykkisholmur, June 25th; Siglufjördr, July 8th; Dyrefjördr, June 24th; Isafjördr, June 23rd. *Melanippe thulearia*: Reykjavik, June 13th; Dyrefjördr, June 24th; Patriksfjördr, June 24th; Stykkisholmur, June 25th. *M. biriviata*: Reykjavik, June 13th, 26th, and 28th; Onundafjördr, July 5th; Akureyri, July 9th and 10th. *Phycis fusca*: July 2nd and 5th. *Aphelia osseana* (= *pratana*): Engey, June 14th; Reykjavik, July 2nd; Dyrefjördr, July 5th; Husavik, July 11th.

From pupæ found under stones at Thorshavn, Flatey Island, Stykkisholmur, &c.:—The only specimens that emerged were *Charæas graminis* (Thorshavn), and I think it is probable that all the chrysalids were of this species.

NEUROPTERA.—PHRYGANEIDÆ.

Limnophilus griseus: Thorshavn (Faroe Isles), June 9th; Reykjavik, June 13th, 14th, 26th, 28th, and July 2nd; First voyage round

Iceland,—Seydisfjördr, June 18th; Akureyri, June 20th; Isafjördr, June 23rd; Dyrafjördr, June 24th; Second voyage round Iceland,—Dyrafjördr, July 5th; Siglufjördr, July 8th; On steamer off Orkneys, July 16th.

HEMIPTERA.

Salda littoralis, and larvæ of same, Reykjavik (June 30th, prob.); other larvæ of same species, Akureyri, prob.

ORTHOPTERA.

Forficula auricularia (N.B. The earwig abounds in the Faroe Isles, but does not occur in Iceland): Thorshavn, June 9th, all very small and immature (on flowers of *Caltha eu-palustris*, which they had gnawed nearly down to the calyx); July 15th, under stones (considerably grown in a month's interval).

ENTOMOLOGICAL NOTES, CAPTURES, &c.

DR. STAUDINGER'S COLLECTION. — There is no foundation for the rumour that Dr. Staudinger desired to dispose of his collection in consequence of failing health. We are in a position to state that at the present time the Doctor is better in health than he has been for some years past, and that he has never had any intention of disposing of his collection.

NOTES FROM CANNOCK CHASE.—I have this year found imagines to be quite up to the average in point of numbers, though I cannot say the same of larvæ. In the early spring I took *Brephos parthenias*, *Asphalia flavicornis*, *Larentia multistrigaria*, and others. Visiting the Chase again during the beginning of August, I was gratified by the sight of numbers of *Stilbia anomala*, which were flying over the heather. It has, so far as I can discover, never been taken there before. I took about 150 in all, only three of which were females, and the majority had managed to damage themselves more or less. I also took at that time *Orthosia suspecta*, *Hepialus sylvanus*, *Polia chi*, *Gortyna ochracea* (flavago), *Crocallis elinguaris*, *Asthena luteata* and *Eupisteria oblitterata* (heparata), both getting worn, and *Geometra papilionaria*. I had to leave before *Calocampa solidaginis* emerged, but heard that it occurred abundantly. *Eupithecia nanata* and *E. minutata* occurred plentifully among the heather, and I got larvæ of *E. pulchellata* from foxglove; it had, however, entirely deserted its old haunts, though there were plenty of foxgloves. I got my larvæ from a garden on the edge of the Chase. I paid another visit in September, and devoted my energies to larvæ. From young poplar trees I got *Dicranura bifida* and *Notodonta dictæa*. I beat an immense number of birch trees with but meagre results—*Notodonta dictæoides*, *N. dromedarius*, *Lophopteryx camelina*, *Drepana lacerinaria* and *D. falcataria*, *Cymatophora duplaris* and *Asphalia flavicornis*, *Hadena adusta*, and *Geometra papilionaria* dropping into my umbrella, at long intervals, one at a time. I got about thirty larvæ of the above in all. I also got three or four *Amphidasys betularia*, usually common enough. With regard to this insect, I have found that all the larvæ from the Chase, and which are birch-feeders, produce the var. *doubledayaria*, while the lime-feeding larvæ I get in Rugeley—about 1½ mile from the Chase—almost

invariably produce the normal form. The "Huddersfield soot theory" evidently will not do here. Possibly the nutritious value of the food has something to do with it. *Cabera pusaria* and *Phalera bucephala* were both abundant, the latter unusually so. Ragwort yielded *Eupithecia absynthiata* and *E. castigata*, and I also got *E. fraxinata*, *E. assimilata*, and *E. exigua*. One of the chief prizes of the district, viz. *Acronycta leporina*, was conspicuous by its absence, which applies also to *Panolis piniperda*, usually fairly plentiful. I heard that *Cosmia paleacea* (*fulvago*) had been turned up on the Chase this year by a Birmingham entomologist. This makes another addition to the already long list of insects to be found there. I believe it is stated that the brown form of the larva of *N. dictæa* only occurs after the last moult. I have taken a large number of these larvæ, and I find, if they are kept in a box or case, the interior of which is not well lighted, every larva, irrespective of size, will become brown, or at any rate much more brown than they originally were; irrespective of size and age, the younger individuals do not assume such a dark and well-marked brown coat as their seniors, but the yellow line on each side disappears, and the whole larva becomes a dirty yellow in colour. At the end of the season, about the beginning of October, when the poplar leaves become scanty and yellowish in colour, the larvæ rest mostly on the twigs, and even when feeding they insure their safety by retaining a hold on a twig by means of their anal claspers. These larvæ are all, or nearly all, of the brown type, and some will be found that have not undergone their last moult. These larvæ may be found full fed from the end of July to the middle of October, and this also applies to the larvæ of *N. dictæoides*. They do not seem to be double-brooded, as I have never bred the perfect insect in the autumn from the early larvæ. I have found the imago of *N. dictæoides* in good condition as late as the 7th of September. I have never, however, taken an imago of *N. dictæa*, plentiful though the larvæ are about Rugeley. At this present time (October 3rd) I have half-grown specimens of both *N. dictæa* and *N. dictæoides*, and I got both full fed the first week in August. —RICHARD FREER; St. Mary's Hospital, Paddington, W.

NEW FOREST NOTES. — I have read with much interest Mr. E. G. Alderson's notes on his experiences at Lyndhurst during the last week of June (Entom. 258); and now forward a few observations concerning the Lepidoptera seen by me from the 13th to 26th July, in the same neighbourhood. The weather during the first half of my stay was very unsettled, but it improved greatly afterwards, and the result was, consequently, rather more encouraging than that recorded by your correspondent. *Argynnis paphia* was fairly common, the females appearing more abundantly towards the end of the month; I only saw two specimens of the var. *valesina*. *A. aglaia* occurred sparingly on the heaths, and *A. adippe* was represented by a solitary specimen. In the enclosures *Epinephele ianira*, *E. tithonus*, *E. hyperanthes*, *Hesperia sylvanus* and *H. tharinas* (*linea*) were abundant and in fine condition. *Limenitis sybilla* was less common than usual, and the males were mostly worn. I was surprised at only taking three *Thecla quercus*, and in one enclosure—where this species was abundant in 1886—none were to be seen. Of the genus *Lycæna* the only representative was *L. ægon*, which was plentiful on the heaths, and in good condition. *Satyrus semele* was just appearing when I left the Forest, but I managed to secure a few fine males. Among the Heterocera the Noctuæ were, with the two exceptions of *Agrotis strigula* and *Anarta myrtilli*, a blank, for I did not

attempt "sugaring," as I was told that it was useless. The heaths proved to be the best localities for moths, *Nemeophila russula*, *Eubolia palumbaria* and *Anarta myrtilli* occurring by day, and *Gnophos obscuraria*, *Pseudoterpna pruinata*, *Acidalia straminata*, *Selidosema ericetaria* and *Agrotis strigula* at dusk. "Nothing" in the woods resulted in the capture of *Calligenia miniata*, *Acidalia bisetata*, *A. scutulata* and *Hemithea strigaria*. With regard to *C. miniata* I may add that I netted twenty specimens in about ten minutes, almost without stirring from one spot; but on going to the same place on the following evening only one put in an appearance. Besides the above I took odd specimens of *Cleora glabraria*, *C. lichenaria*, *Boarmia roboraria*, *Ellopiopsis prosapiaria*, *Macaria liturata*, *Bupalus piniaria* (this species was still abundant, although, as might be expected, very worn), *Emmelesia alchemillata*, and *Melanthia albicillata*, while *Eubolia limitata* (*mensuraria*) was swarming along the side of the railway line near Brockenhurst. I also found a female *Pachynemius hippocastanaria* drying its wings on a stem of bracken. Is not this a very late emergence? The only larvæ I came across were those of *Euchelia jacobææ*, which were to be seen on every other patch of ragwort. Although the Geometræ were out in some variety, this season seems to have been very bad in the New Forest, every collector whom I met agreeing as to the scarcity of insects.—W. H. JACKSON; 4, Queen Anne Villas, Grove Road, Walthamstow, Sept. 24, 1890.

COLLECTING IN DURHAM.—For the last three years I have spent the early part of August at Bishop Auckland, and on each occasion have collected Lepidoptera whenever the weather permitted. Unfortunately the weather has been in an unsettled condition each time I have gone North, consequently I have not been able to get together many species, and most of these are common ones. There are no woods of any extent in the immediate vicinity of the town, but about a mile to the east there is a small one called Belburn, containing mixed timber, including some fine beech trees, but the undergrowth in places is rank. *Cidaria immanata* and *Hyppipites sordidata* are sometimes plentiful, and many pretty forms of each have been secured. *Larentia didymata* here, as elsewhere, is abundant, and the only thing of interest concerning it is that the females are uniformly paler than those taken in other parts of the district. In 1889 *Cerostoma sequella* was fairly common in this wood, but not a specimen was to be seen this year. There is another wood to the south, distant about two miles. It was here that I last year found a larva of *Notodonta chaonia*, which produced a splendid dark imago in June. I expected to get more larvæ of this species this year, and went to work with a will, but all my efforts were in vain; not a larva of any kind could I dislodge, if there were any to be dislodged. Except some old twisted and rolled leaves, the foliage of the oaks appeared to be free from the attacks of lepidopterous larvæ. Some very nice forms of *Pædisca solandriana* were captured in this wood last year, but the species was not out when I visited the place this year. The best collecting-ground lies to the west, a few miles up the Wear Valley. Through the kindness of Mr. R. Calvert, who obtained permission of the owner, I sometimes enjoyed the privilege of collecting in some of the fine woods and plantations above Wolsingham and other places in Weardale. I could not, however, get any night-work there. Among other things taken in these excursions were some female specimens of *Argynnis aglaia* which have the basal half of the wing deeply suffused with black: these were captured in 1888. I did not see the species in 1889, but it was plentiful this year,

though none of the specimens examined were anything like so dark as those secured in 1888, when dark examples of *Eubolia limitata* (= *mensuraria*) were also obtained. Of the last-named species I got some striking forms again this year; one has the ground colour of fore wings pale, with a broad, black, central fascia, and the hind wings are pale brown, with whitish central line. *Plusia interrogationis* was found at rest on the top of a stone wall, and was most acceptable, as, although "my series is quite full," I regard this particular specimen highly, as it was from it that I obtained my first idea of what the insect looked like when at rest in a state of nature. *Larentia cæsiata* was common in 1888, but I did not see it last year, and it was hardly well out this year. This species is also fond of sitting on rocks and stone walls, but it is only those specimens that have recently emerged from pupa that will allow one to box them from their resting-place. *L. salicata* was found with the last species, but was always scarce. *Emmelesia minorata* (= *erictata*) fairly common last year, but I could not get one this year, and I only saw one in 1888. *L. didymata*: one specimen captured this year is the darkest I have yet seen of this species. *Cidaria immanata*: most of the specimens captured were much darker than those from Belburn or Brusselton. The sea-cliffs at Castle Eden were visited, and a few interesting species obtained, including three examples of *Lycæna astrarche* var. *salmacis*; but the beautiful glen known as Castle Eden Dene, which is reputed to be a good entomological locality, had nothing better than one poor specimen of *Metrocampa margaritaria* to produce for my entertainment when I visited it on the 12th of August, 1888. Upper Teesdale is within practicable distance for an excursion, but almost too far to be done comfortably in one day,—that is, if any time is to be given to the Lepidoptera of the moors. I only went there once (8th of August last), when I took the train to Middleton, and from thence walked on the Yorkshire side of the Tees to White Force, then over the river to the Durham side, and back to Middleton, looking in at High Force on the way. The distance traversed was said to be about eighteen miles, but the way over the moors was rough. I picked up some splendid *L. cæsiata* from the rocks: these appear to be more strongly marked than the Weardale specimens. A small dark form of *L. didymata* abounds on these moors. I was especially pleased to meet with *Amphisa gerningana* and *Pamplusia monticolana* (= *mercuriana*) for the first time. Sugar does not seem to be seductive in the month of August at Bishop Auckland. This year not one moth visited the bait whilst I was there, and I understand that this attraction has failed to allure Noctuæ in any numbers throughout the summer, at least since May. The ragwort flowers yielded several common species, such as *Noctua xanthographa* (some very dark forms) and *Triphæna pronuba*, also a few *N. umbrosa*. Plenty of *Polia chi*, with a good proportion of var. *olivacea*, are usually to be met with on the walls, but the species was not out this year in time for me,—neither was *Larentia olivata*, which I have found in the wood above the cemetery.—RICHARD SOUTH.

NOTES FROM RINGWOOD.—Having noticed that it is many years since any record of Lepidoptera taken in this neighbourhood has been published in 'The Entomologist,' I thought an account of a few of my captures might possibly be useful to collectors contemplating a visit to Ringwood. Insects have been fairly plentiful this year, and a few species abundant, especially *Gonopteryx rhamni*, *Vanessa io*, *V. urticæ*, *Pararge egeria*, *Epinephele hyperanthes*, *E. tithonus*, and others. It was a pleasant sight to see

such numbers of *G. rhamni* and *V. io*; both literally swarmed in the Forest. I netted three specimens of the latter with the yellow markings replaced with white, and saw more. *E. hyperanthes* varied considerably from the var. *arete*, to very fully-developed eye-spot specimens, two exceptionally so; the large fritillaries rather scarce, although *Argynnis euphrosyne* and *A. selene* were common. On one day in August I took *A. paphia* and var. *valesina*, *A. adippe*, *A. aglaia*, *A. euphrosyne* (worn), and *A. selene*. *Limenitis sibylla* scarce: this species I bred from larvæ beaten in June, and have seen the imago deposit ova on two or three occasions, and by searching honeysuckle leaves have taken the ova freely: these are nearly always to be found upon the upper edge of the leaf; sometimes, though rarely, on the leaf-stalk. *P. egeria*, bred from ova, and now in pupa; *Pararge megæra* and *Satyrus semele*, common; *Polyommatus phlæas*, *Thecla quercus*, and *Lycæna icarus*, all scarce; *L. argiolus*, not a dozen seen; *L. ægon*, local and few; *Pamphilus sylvanus*, *P. thaumas*, *Nisoniades tages*, and *Hesperia malvæ*, common; *P. thaumas*, very dark and in strong contrast to *H. lineola*; *Vanessa cardui* and *V. atalanta*, scarce and very late; *Euchloë cardamines*, *Pieris napi*, *P. rapæ*, *P. brassicæ*, and *Epinephele ianira*, well represented, but of *Thecla rubi* one specimen only. I cannot help remarking the duration of certain species, thus—*P. egeria* occurred from April to October, with a very short interval; *A. euphrosyne* well into the *A. selene* brood; *A. paphia* and *A. aglaia* to the 6th of September; *P. thaumas* was a very long time upon the wing. *A. aglaia* I found the most plentiful of the large fritillaries, females of which vary considerably, three distinct shades,—viz., 1, very dark all over; 2, colour of male; 3, light straw and bright. I have taken similar forms at Dover, whilst my Dorset specimens are all typical. The last walk I took for Rhopalocera this season was to Bolderwood, on the 16th of October, when I observed the following:—*G. rhamni*, *V. io* (2), *V. atalanta*, *V. urtica*, *P. rapæ*, and *Pararge egeria* (all fairly late). Of course it is well known that Ringwood is noted for *Emydia cribrum*, but this is not the only good species met with here; still by the number of entomologists who come solely for it, one would think otherwise; and what a lot of disappointment there is in netting this species, because so many do not know the correct time and locality to search: the whole of June and first week in July it is upon the wing,—first fortnight in June for really fine specimens: doubtless a few may be caught after the above date, still I do not believe in a distinct double brood. I went in August and searched upon the heaths, but in vain; whilst in the above-stated time I found it plentifully. In one week Mr. Gerrard and myself took about eighty each, and upon what we considered fresh ground, until our old friend Mr. Corbin informed me he used to get it there when he was a boy. I have discovered it in several places much nearer Ringwood than the old St. Leonard's locality. It is local over a great stretch of heath west of the River Avon. I am not aware of *E. cribrum* occurring in the New Forest at all, or why should the local collectors of that district come here for it? I note that the species is not confined to certain spots, but is generally distributed over a particular area. Beating for it by day is very slow work compared with netting at night. As the sun descends specimens can be observed crawling upon the heath-tops, and from about half an hour after sunset until midnight they fly in great numbers. Of the specimens netted about 60 per cent. are males; the females are best obtained by searching.—J. H. FOWLER; Poulner, Ringwood, Oct. 22, 1890.

CHELONIA VILICA: 177 PARASITES FROM ONE LARVA.—On the 8th June, 1889, I found at Torcross, South Devon, a larva of *C. vilica*, surrounded by 177 *Apanteles* cocoons. I carefully removed them from the stone on which they were clustered into a glass-bottomed box, and on the 22nd June I bred 48 *Apanteles ruficoxis*, Marshall, n. sp., MS.; on the 30th June, 1 female *Hemiteles fulvipes*; 3rd July, *Pezomachus tristis*, males and females; and on the same day, 64 males of *Hemiteles fulvipes*. A goodly mixture from one poor caterpillar.—G. C. BIGNELL; Stonehouse, Plymouth, November 6, 1890.

LARVÆ IN 1890.—With reference to the query respecting the occurrence of larvæ (Entom. 322), I am able to record only one species common in the larval state, that being *Arctia caia*, which was extremely plentiful this year round London.—J. M. ADYE; Christchurch, October 20, 1890.

LARVA OF ACRONYCTA ALNI AT CLIFTON.—I have to record the occurrence of a larva of *A. alni* here on the 18th of August last. I found it, curiously enough, crawling on the ground within a few feet of a gas-lamp, on which, three years previously, I took a specimen of the perfect insect at light.—R. M. PRIDEAUX; 9, Vyvyan Terrace, Clifton.

ARCTIA VILICA BRED IN OCTOBER.—Early in June last some eggs of *Arctia vilica* were obtained. These hatched, and some sixty larvæ were fed on groundsel (*Senecio vulgaris*). About the middle of September ten of these larvæ spun up (the rest are hibernating as usual). In October ten perfect imagines appeared. Is not this most unusual? An acknowledged authority assures me it is unprecedented, as far as his observation has gone.—ALLAN NESBITT; Seaton, Devon, November 6, 1890.

DILOBA CÆRULEOCEPHALA ON PRUNUS LAUROCERASUS.—Adverting to the discussion (Entom. 327 and 345) respecting the larva of *Diloba cæruleocephala* having been found feeding on laurel, it appears to me that it is not sufficiently recognized that the shrub usually called the laurel is the laurel cherry, *Cerasus laurocerasus*, and not a *Laurus*. No one would be surprised if the larva in question was found feeding on the common cherries, derived from *Cerasus caproniana* and *C. avium*, or any of the species of the closely-allied genus *Prunus*. The sloe, *Prunus spinosa*, is, indeed, one of the most common food-plants of the caterpillar. The fact of the larva feeding on an evergreen cherry as well as a deciduous one, is a parallel case to that of *Gonopteryx rhamni*, which fed in my garden on the evergreen *Rhamnus alaternus*, although the shrub presents much the same difference to the eye from our two native species of *Rhamnus* as the laurel cherry presents from our two common species of cherry. The interest, in each case, arises from the fact that the parent lepidopteron, when depositing her eggs, recognized the generic affinity of plants widely different in appearance.—J. JENNER WEIR; Chirbury, Beckenham, Kent.

SUGAR A FAILURE AT CHRISTCHURCH.—It may be of interest to note that sugaring here has again proved unsuccessful, though when I first commenced at the end of June, and from that date till July 10th, there seemed some hopes of a better season. During the time adverted to I took the following:—*Thyatira batis* (3), *T. derasa* (1), *Acronycta megacephala* (1), *Leucania conigera* (2), *L. lithargyria* (2), *L. pallens* (several), *Dipterygia scabriuscula* (6), *Mamestra sordida* (2), *Apamea basilinea* (1), *A. gemina* (4),

Miana strigilis (common), *M. arcuosa* (2), *Grammesia trigrammica* (1), *Rusina tenebrosa* (3), *Noctua plecta* (1), *N. triangulum* (1), *N. festiva* (several), *Mania typica* (3), *Aplecta nebulosa* (1), *Hadena dentina* (1), *H. dissimilis* (1), *H. oleracea* (1); and a few of the usual pests, fairly common. After this I went into Somersetshire for some days, and on my return (July 20th) found sugaring perfectly useless, not meeting with even a single specimen. This dearth of insects continued, whilst trying at intervals, up till about September 21st, when, after a long spell of dry weather, there came a very wet day, rain falling in torrents the whole day, especially in the evening. I then ventured out upon my favourite experiment, and so had the pleasure of seeing insects congregated in some numbers on the trees, which was gratifying to view, though, under the circumstances of the weather, far from comfortable. The following were my captures:—*Epunda lutulenta* (1), *Anchocelis lunosa* (vars., 4), *A. litura* (1), *Xanthia cerago* (1), *Calocampa vetusta* (fine, 2), *Noctua c-nigrum* (4), *Cidaria immanata* (several), *Phlogophora meticulosa* (fairly common); and a few of the usual pests, only represented by two or three odd specimens. A day or two after this I took two more fine *E. lutulenta*, and a few each of *A. lunosa* and *N. c-nigrum*; but, as the weather became drier, moths got scarcer, as before. I think this experience coincides with that of Mr. A. E. Hall and Mr. R. Adkin (Entom. 321, 322).—J. M. ADYE; Christchurch, October 20, 1890.

THE VIOLET TINGE IN *HELIOPHOBUS HISPIDUS*.—It may be interesting to note that the violet tinge was almost entirely absent from specimens of *Heliohobus hispidus* taken by me this year at Portland. From this I should suppose that the species varied in this respect in different years, which may account for the fact that I did not notice any tinge until 1889 (Entom. 60).—NELSON M. RICHARDSON; Montevideo, near Weymouth, November 13, 1890.

SIREX GIGAS.—Yarmouth.—A specimen of this insect was brought to me, alive, in July. It was taken off a gentleman's back in the market. A friend of mine has one, which he captured in the town about two years ago.—J. E. KNIGHTS; North Denes, Great Yarmouth.

Tenby.—A specimen of *Sirex gigas* was brought to me when at Tenby last August.—T. B. JEFFERYS; Clevedon.

DISPARITY OF SIZE IN SIRICIDÆ.—Several specimens of *Sirex gigas* were taken here and in the neighbourhood during the autumn. The great discrepancy in size in different insects of both sexes in the Siricidæ is very striking. A female of *Sirex juvenicus* sent me by Mr. J. E. Robson, captured at Hartlepool on 30th September last, measures only $1\frac{1}{4}$ inch from tip to tip of wings; the length of the body, including head and ovipositor, being $\frac{3}{4}$ of an inch; whilst a female of *S. juvenicus*, taken here, measures in wing expanse 2 inches; the length of body, with head and ovipositor, is $1\frac{1}{4}$ inch. The disparity in *S. gigas* is equally remarkable.—JOSEPH ANDERSON, jun.; Chichester.

INFORMATION WANTED.—If any of your readers can supply me with any facts they may have observed or know as to the life-history of the Siricidæ, especially of *Sirex gigas*, I should be much obliged. I want them to incorporate with a paper in preparation. Please write direct to Dr. LIVETT, Wells, Somerset.

NOTES FROM LANCASHIRE AND MERIONETHSHIRE.—Spending a few days at Grange-over-Sands last Whit-week, I took three specimens of *Nemeobius lucina*, and a friend secured a fourth. I also took a good series of *Leucophasia sinapis*, as well as several *Lycæna argiolus*, *Anarta myrtilli*, and *Saturnia pavonia (carpini)* in the neighbourhood; the two last, of course, on the mosses. I spent a few days at Towyn, in Merionethshire, early in July, and found at Dolgoch, a beautiful gorge in the neighbourhood, *Epinephele hyperanthes* in abundance.—W. HOWARD GOULTY; Romily, Cheshire, November 7, 1890.

CAPTURES FROM GAS-LAMPS.—September 5th, 1890. I took *Phibalapteryx vittata (lignata)*, *Coremia designata (propugnata)*, *Cidaria testata*, *C. immanata*, *Melanippe fluctuata*, *Halia vauaria (wavaria)*, *Eugonia alniaria (tiliaria)*, *Paraponyx stratiotalis* (abundant), *Noctua glareosa* (hitherto unrecorded for Chester), *Luperina testacea*, *L. cespitis*, *Neuronia popularis*, *Anchocelis lunosa*, *Cosmia trapezina*, *Noctua xanthographa*, *Hydræcia micacea*, *Porthesia similis (auriflua)*, and one *Hepialus humuli*. This is the first specimen of *H. humuli* I ever took at or from a gas-lamp. It is a small female, apparently fresh from the chrysalis, and is a couple of months out of date.—J. ARKLE; Chester.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—Nov. 5th, 1890. The Rt. Hon. Lord Walsingham, M.A., F.R.S., President, in the chair. Mr. Francis H. Barclay, of Knott's Green, Leyton, Essex; Miss M. Kimber, of Cope Hall, Enborne, Berkshire; and Mr. John E. Robson, of Hartlepool, were elected Fellows; and Major-General Carden, Mr. J. E. Eastwood, and Mr. A. E. Hall were admitted into the Society. Lord Walsingham announced the death of Mr. Atkinson, of the Indian Museum, Calcutta. Mr. A. H. Jones exhibited a number of Lepidoptera collected in June last near Digne, Basses Alpes, including *Papilio alexanor*; *Parnassius apollo*, larger and paler than the Swiss form; *Anthocharis tagis* var. *bellezina*; *Leucophasia duponcheli*; *Thecla spini*; *Thecla ilicis* var. *cerri*; *Lycæna argiades* var. *corretas*; *L. argus* var. *argyronomon*; *L. bellargus* var. *ceronus*; *Melitæa deione*; and *Argynnis euphrosyne*. Mr. W. E. Nicholson also exhibited a collection of Lepidoptera, formed near Digne, last June, which included very large specimens of *Papilio machaon*; *P. podalirius*; *Thais rumina* var. *medesicaste*, larger and redder than the Mediterranean specimens; *Apatura ilia* var. *clytie*; *Argynnis adippe* var. *cleodoxa*; *A. daphne*; *Melanargia galatea* var. *leucomelas*; *Vanessa egea*, bred from pellitory; *Satyrus semele*; and many others. Mr. C. O. Waterhouse exhibited the upper and lower membranes of a wing of a species of *Attacus*, which had been separated without removing the scales, and mounted on glass so as to show the internal surfaces. - He explained that he separated the membranes first by inserting a needle in the vein at the base of the wing, and, when they were sufficiently parted to be taken hold of, they were gradually drawn asunder, and floated on water until the two membranes were entirely separated. He said that some years ago Dr. Hagen had shown that this could be done with fresh examples of *Libellulidæ*. Dr. D. Sharp exhibited a photograph he had received from Prof. Exner,

of Vienna, showing the picture obtained at the back of the eye of *Lampyrus splendidula*. He stated that this picture is continuous and not reversed, and shows the outlines of lights and shades of objects at a distance as well as of those closer to the eye. Mr. H. Goss exhibited a specimen of *Zygæna filipendulæ* var. *chrysanthemi*, which he had taken at Rhinefield, in the New Forest, on the 15th July last. Dr. P. B. Mason said this variety was known on the Continent of Europe, and was figured by Hübner in his 'Sammlung,' a copy of which work he exhibited. He added that he possessed a similar specimen of this variety taken by Mr. Nowers in Wyre Forest, Worcestershire. Colonel Swinhoe stated that he possessed a similar variety of a species of *Syntomis*. The Rev. Dr. Walker exhibited a number of Diptera, Hymenoptera, and Coleoptera recently collected in Iceland; also some drawings illustrating the various forms of *Crymodes exulis* occurring in Iceland which he had shown at the October meeting of the Society; he also exhibited seven varieties of *Melanippe thuleana*, nine of *Coremia munitata*, and a few of *Noctua conflua*, illustrating the varied forms of these species occurring in Iceland. Dr. Mason said that the only British specimens of *N. conflua* which he had seen resembling the Iceland form of the species were taken at Wolsingham, Durham. Mons. A. Wailly exhibited and remarked on a number of Lepidoptera from Japan. The collection comprised about forty-one species, eleven of which, it was stated, were not represented in the British Museum collections. Mr. A. C. Horner exhibited a number of rare species of Coleoptera, including *Homalota crassicornis*, Gyll., *H. fimorum*, Bris., *H. humeralis*, Kr., and *Euryporus picipes*, Pk., collected at Church Stretton, Shropshire; and also *Amara nitida*, Sturm., *Oxyptoda amæna*, Fair., *Homalota testaceipes*, Heer, *Lithocharis apicalis*, Kr., and *Epuræa neglecta*, Heer, from the neighbourhood of Tonbridge. Mr. Meyer-Darcis exhibited a specimen of *Termitobia physogastra*, Gangelb., a new genus and species of Brachelytra obtained in a white-ants' nest from the Congo. Dr. Sharp commented on the interesting nature of this exhibition. Colonel Swinhoe exhibited a collection of moths from Southern India, which comprised about forty-one species, distributed amongst the following families:—Syntomidæ, Lithosiidæ, Arctiidæ, Lasio-campidæ, Zerenidæ, Fidonidæ, Leucanidæ, Heliothidæ, Acontiidæ, Poaphilidæ, &c. He also read a paper describing these species, entitled "New Species of Moths from Southern India." The Rev. T. A. Marshall communicated a paper entitled "A Monograph of British Braconidæ. Part IV." Lord Walsingham read a paper entitled "African Micro-Lepidoptera," containing descriptions of seventy-one new species, and of the following nine new genera, viz.:—*Autochthonus* (type *A. chalybiellus*, Wlsm.), *Scalidoma* (type *Tinea horridella*, Wkr.), *Barbaroscardia* (type *B. fasciata*, Wlsm.), *Odites* (type *O. natalensis*, Wlsm.), *Idiopteryx* (type *Cryptolechia obliquella*, Wlsm.), *Microthauma* (type *M. metallifera*, Wlsm.), *Lâmocera* (type *L. lyoniella*, Wlsm.), *Oxymachæris* (type *O. niveocervina*, Wlsm.), and *Micropostega* (type *M. æneofasciata*, Wlsm.). Several European and American genera were recorded as new to the African fauna, and the occurrence of one Australian and two Indian genera was also noted.—H. Goss, *Hon. Sec.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.
—October 23rd. W. H. Tugwell, Vice-President, in the chair. Messrs. P. J. Crane, of Chingford, and G. Wallace, of Forest Hill, were elected members. Mr. Bouttell exhibited two series of *Eugonia quercinaria*,

Hufn., one bred from larvæ fed on elm, and the other on sallow. He stated that those fed on elm were, by accident, kept without food for some time after the first moult, and in consequence most of the brood perished. Nineteen reached the perfect stage, of which only two were females. Mr. E. Joy, bred examples and pupæ of *Plusia festuæ*, L. Mr. Tugwell, a box of Lepidoptera, collected by Mr. Lachlan Gibb in Canada. Mr. R. Adkin, specimens of *Tortrix piceana*, L., from Surrey and Hampshire, and expressed an opinion that the species was more widely distributed than was generally supposed. Mr. South remarked that the species had been known in England for many years. Mr. Fenn thought it had been overlooked owing to the difficulty in obtaining the larvæ, which fed on the tops of the trees. Mr. C. G. Barrett said the species was an abundant one on the Continent. Mr. Hawes, examples of *Argynnis euphrosyne*, L., showing considerable variation in the black markings. Mr. P. Bright, two varieties of *Arctia caia*, L., one very dark and the other an extremely pale form; also a series of *Triphæna orbona*, Hufn. (*subsequa*, Hb.), from Forres. Mr. Bright stated he had written for further particulars of the specimen of *Vanessa* exhibited by him on the 25th ultimo, and which was stated to have been taken at Polegate; he understood that Mr. Weir, referring to this specimen, had expressed an opinion that it was an example of *Vanessa milberti*. Mr. Cockerell exhibited a cocoon of *Zygæna filipendulæ*, L., from near Leigh, Essex, not uniformly yellow, remarking that sometimes the cocoons of this species were half yellow and half white or whitish. He also showed *Myzias sexincta*, Fabr., from Long Island, and said that this species was found by Dr. Riley in the stomachs of sparrows (*Passer domesticus*) in thirty instances, thus showing that its wasp-like attributes did not protect it from that bird; also a Tipulid fly allied to *Tipula*, but apparently belonging to a new or little-known genus from Swift Creek, Custer Co., Colorado, where it mimics a species of Ichneumonidæ found in the same locality.

November 13th.—W. H. Tugwell in the chair. Messrs. G. Champion, of St. John's Wood; A. J. Hodges, of Highbury; and A. H. Hill, of Hampstead, were elected members. Mr. Wellman exhibited *Bryophila impar*, Warren, from Cambridge, and a specimen of *B. muralis*, Forst., from Folkestone, very similar to the examples of *impar*. Mr. Tugwell, long series of *Cerastis vaccinii*, L., and of *C. spadicea*, Hb. A discussion ensued as to this exhibit, in the course of which Mr. South said that *spadicea*, Hb., was a form of *vaccinii*, and that the form shown by Mr. Tugwell as *spadicea* was known on the Continent as *subspadicea*, which was said to be a form of *C. ligula*, Esp. Mr. C. G. Barrett remarked he had never had any difficulty in separating the two species. Mr. R. Adkin, examples of *Spilosoma mendica*, Clerck, bred from ova obtained by the pairing of a female of the Irish form of the species with a male of the English form. From the ova obtained only two moths were bred, both of which were males, and neither were like the English or Irish form. Mr. Tugwell remarked that Mr. Adkin having bred the species from the two forms, there could be no longer any doubt as to the two forms being one and the same species; the two examples shown were very similar to the Yorkshire specimens bred by Mr. Harrison. Mr. Adkin also exhibited *Peronea sponsana*, Fb., from the New Forest, and referred to his exhibit of this species in 1889, when nearly all those then shown were the variety. This year he had endeavoured to obtain the species as it occurred in the New

Forest; out of some twenty specimens there were only four or five of the variety, the others gradually descending to the type, but none of them were exactly like those taken the previous year. Mr. Tugwell stated that he had obtained the form now shown, at Blackheath. Mr. Atkinson exhibited a small collection of all Orders of Insecta from Africa. Mr. T. D. A. Cockerell, insects from the Wet Mountain Valley, Colorado, to illustrate parallel variation in Diptera and Hymenoptera; series one, green to blue (metallic colours); series two, yellow to red (pubescence). Some observations were made on the abundance this year of the larvæ of *Mamestra persicaria*, L., in the neighbourhood of London.—H. W. BARKER, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—October 20th, 1890. Mr. W. G. Blatch, F.E.S., President, in the chair. The Rev. E. J. Nurse, 45, Francis Road, Ladywood, was elected a member of the Society. Mr. R. C. Bradley showed *Semasia wæberiana*, from his garden at Moseley. Messrs. P. W. Abbott and C. J. Wainwright showed collections of insects taken at Porlock, Somersetshire, this year. Mr. W. G. Blatch showed a fine series of *Ætophorus imperialis*, from Colchester. He also submitted a complete list of the Coleoptera taken by himself at Church Stretton, during a recent visit. The list included 125 species, represented by 610 specimens. A long discussion followed on the season, in which Messrs. W. G. Blatch, G. T. Baker, and C. J. Wainwright joined. The general opinion was that it had been a very bad one for insects.

November 3rd, 1890. Mr. W. G. Blatch in the chair. Mr. P. W. Abbott showed *Gortyna ochracea* and *Nonagria arundinis*, from Sutton. These had been very greasy, but had been quite cleaned by immersion in benzine. Mr. Blatch said that he had quite removed the grease from a beetle by immersion in petrol. Mr. A. Johnson showed *Pæcilocampa populi*, from Sutton, *à propos* of which Mr. Thorneill said that he had known larvæ of this species come to sugar. Mr. R. C. Bradley showed a nice series of *Hypsilophus marginellus*, bred from larvæ sent him by Mr. Eustace Banks. Mr. C. J. Wainwright showed *Zygæna meliloti*, from the New Forest; also *Zygæna filipendulæ*, from Stroud, several specimens of which showed more or less yellow.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY.—October 13th, 1890. Monthly meeting. S. J. Capper, F.L.S., President, in the chair. Mr. P. Schill, of Manchester, was elected a member. The President made some remarks on the proposed record of the Insect Fauna of Lancashire and Cheshire, and presented the Society with a copy of the work by the late Benjamin Cooke, one of the former Vice-Presidents. In speaking of this gentleman, the President said that any work he had done might be relied upon, as he was one of the best authorities on the neglected Orders of insects that had ever lived. A resolution was subsequently passed requesting the existing Council of the Society to form a Committee for the purpose of undertaking the work. Messrs. Harker and Jones read a paper entitled "A week at Howth," in which they gave a graphic description of a week's collecting at this locality, illustrating the paper with a large number of specimens. During the *conversazione* the President showed some fine varieties of *Arctia caia*. The Vice-President showed forms of *Vanessa antiopa* for comparison, and Mr. Sharp Coleoptera collected at Howth.—F. N. PIERCE, *Hon. Sec.*

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"By mutual confidence and mutual aid
Great deeds are done and great discoveries made."

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—
1891.

"Granting, with the doctrine of evolution, that all the complex assemblages of existing animal forms are modified derivatives from previously existing forms, and that these are ultimately to be traced back to some common ancestor, it must of necessity follow that any given fauna will depend for the degree of its peculiarity, whether great or small, upon the amount of modification, relative to any other fauna, which it will have undergone. And this modification can be effected in two ways: by inherent modification of the individual types composing the fauna, and by intermixture with, or immigration from, contiguous or neighbouring faunas. In both cases, manifestly, isolation or its opposite, union of habitation, will constitute the governing factor in determining the amount of variation."—HELPRIN.

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THE SEXES OF LEPIDOPTERA.

By W. F. DE VISMES KANE, M.A., F.E.S.

I AM surprised to find that Mr. Cockerell should have found it necessary to defend the views he put forward in a former paper (Entom. xxii. 177) as to the possibility of the sex being determined in the embryo by external influences, especially food. The hypothesis is now very generally accepted by biologists in relation to animals in general, and may be found stated very clearly and fully in a most interesting volume of the International Science Series, 'The Evolution of Sex,' by Profs. Geddes and Thomson. Mr. Wailly will find in Chap. IV. a reference to Lepidoptera, Mrs. Treat's experiments and Mr. Gentry's opinion being cited. A very strong case is made out in favour of the contention that differences of nutrition, in conjunction with other conditions of environment (chiefly bearing on assimilation probably) in the larval or embryonic state, determine the sexual distinctions. Evidence bearing on the subject is adduced from the life-history of the tadpole, bee, aphid, and certain arthropods. I think most practical entomologists' experience will, in a more or less degree, bear out the theory. I venture to note one or two observations of my own. I have observed in the South of France and in Italy the dwarfing of *L. icarus* and *astrarche*, resulting from the stunted condition of the food-plant produced by the climate and dry soil, and not the less striking is the preponderance of males over females in such localities.

Again, in certain species, we find a vast disproportion in number between the sexes. I would cite *Thestor ballus*. The males emerge earlier than the females and enormously exceed them in number.

May it not be due to the innutritious foliage of the *Lotus hispidus* growing in the arid localities where it is found, namely, the parched hill-sides of South Europe?

The occurrence of a dwarf form of *Euchloë cardamines*, referred to by Mr. Cockerell, is not an isolated instance; and obtains in other species of the genus, notably *E. euphenoides*, occurring in same locality and same time as the ordinary-sized imago. I think it possible that the sparse foliage of the chief food-plant, and its isolated manner of occurrence, may induce semi-starvation of the larvæ when several ova are deposited on a small plant, and this would account for the large preponderance of the male over the female specimens of these species.

A concluding suggestion is thrown out by Mr. Cockerell; that scarcity of nourishment may well tend to the elimination of females, which from their size require ample nutrition. Against this we may place the experiments of Yung on tadpoles, which showed that in normal conditions the percentage of females was only slightly in the majority. But by supplying more stimulating foods of three descriptions, the percentage was raised in Lot 1 to 78, in Lot 2 to 81, and in Lot 3 to 92 per cent. It would be well if entomologists having leisure would supplement our knowledge by further experiments in this direction.

Sloperton Lodge, Kingstown, Ireland, November 12, 1890.

NOTES ON THE LEPIDOPTERA OF THE CHILTERN HILLS.

By A. J. SPILLER.

THE Chiltern Hills, in Oxfordshire and Buckinghamshire, form a range of considerable elevation, their highest point being close to Chinnor, where they attain a height of some 800 ft. They are composed almost entirely of chalk, with in some places a cap of gravel, upon which two common species of heath grow. The district worked by me includes that portion of the range extending from Princes Risborough, in Bucks, to Watlington, in Oxon, a distance of some eight miles. The scenery is exceedingly grand, extensive beech-woods occupying large tracts on this area.

Every sweet, however, has its bitter, and the great drawback to collecting in this neighbourhood lies in the fact that all the woods are strictly preserved, and likewise the idea impressed in the minds of gamekeepers that persons engaged in collecting insects or plants must primarily have designs upon rabbits or "birds." My thanks are due to H. C. Brown, Esq., J.P., for permission to collect in his beautiful woods. This permission has frequently stood me in good stead, as I have on several occasions seen entomologists expelled by obtuse-headed gamekeepers.

Sallow bloom, on the only occasion I tried it in these woods, was not very prolific in rarities, only the commoner species coming to this bait. As the spring advanced I began to search the tree-trunks for recently-developed imagines, and found *Demas coryli* in fair numbers, drying their wings in the evenings throughout the month of May. *Tephrosia crepuscularia* appeared in April and May, and in the latter month *T. consonaria* was likewise very common on the tree-trunks. *Lophopteryx camolina* and *Selenia tetralunaria* (*illustraria*) were also taken in the same situations. *Drepana cultraria* (*unguicula*) was very common both by day and night. On May 15th I caught a specimen at light in a window of my house, which I had specially constructed to act as a moth-trap. As no beech occurs within a mile of my residence, this is interesting, as showing the attractive influence of light. Later on, in the autumn, *Eupithecia sobrinata* came to light in the same manner from the same distance. *Zonosoma linearia* (*trilinearia*) was not very common this season; I was much disappointed in taking so few.

Butterflies were well on the move by the middle of May, when *Thecla rubi*, as I have already recorded, appeared in great numbers, frequenting the whitethorn bloom, or fluttering in merry groups in the beech-glades. The two common May "skippers" and several of the "blues" (*Lycæna argiolus*, *L. alsus*, *L. agestis*, *L. icarus*) were met with, and, at the end of May, *Argynnis euphrosyne* in great numbers. In June *A. selene* appeared, and *Pararge egeria* (second brood) was very numerous. The wet weather in July delayed the appearance of the larger "fritillaries," but on July 10th *A. adippe* came on the scene, and was met with until the middle of August. On July 24th, which was a lovely day amongst many rainy ones, this butterfly was very numerous, showing that in a favourable season it must be an abundant species in all the beech-woods. On this latter date, likewise, I first met with *A. paphia*; it afterwards became common, and I took my last specimen on Sept. 17th. It is plentiful in a wood about half a mile from Chinnor, and, as I have noticed several times during my entomological experience of a quarter of a century, has occasionally a desire to leave its accustomed haunts for apparently aimless wanderings. At any rate, I noticed this season single specimens on two occasions flying in the streets of Chinnor.

Hesperia comma was late in making an appearance; I first saw it on August 4th. This species has a very extensive range here, but is only sparingly met with anywhere. The evening seems to be the best time for its capture, as, while the sun is slowly going below the horizon, it delights to rest itself upon the flower-heads of the scabious, apparently enjoying the warmth. On August 7th, a warm still evening, I captured 27 specimens in this manner in half an hour. *L. corydon* first appeared on August

5th; like *H. comma*, it has an extensive range, but this year must have been scarce, as a dozen to twenty specimens a day formed a very good take of this species. On my return from a holiday, on Sept. 8th, I was surprised to find *H. comma* and *L. corydon* still flying, and my last specimens of each species were taken on Sept. 16th. The ordinary common butterflies have on the whole been much scarcer than usual. I failed to see a single specimen of *Pararge megæra*, although on the lookout for it.

Amongst the moths taken upon the hills this season have been *Nemeophila plantaginis* and *Ino geryon*, already recorded; *Lithosia griseola*, *Biston hirtaria*, and *Amphidasys betularia*, resting on tree-trunks; *Thyatira batis*, *Heliaca tenebrata* (*arbuti*), *Euclidia mi*, *E. glyphica* and *Phytometra viridaria* (*ænea*), *Plusia iota* and *P. pulchrina*, *Hadena genistæ*, *Bapta temerata*, *Neuria reticulata* (*saponariæ*), *Metrocampa margaritaria* (in abundance), *Zygæna filipendulæ*, *Eremobia ochroleuca* (once), *Hepialus hectus* and *H. sylvinus*, *Spilosoma mendica*, *Cilix spinula*, and *Charæas graminis*. This latter species was frequently to be found during the day at rest on scabious flowers, and, after reading the account in Newman's 'Moths' of the time and manner of the flight of this species, I determined to put it to the proof. Accordingly, I appeared on the hills by 8 o'clock on several fine August mornings, and found the insects threading their way in all directions amongst the grass-stems. I secured a fine series, but found, at any rate in this neighbourhood, that their flight was continued to about half-past nine, when they settled for repose during the day.

At "light" at the window I secured a large number of species; on several occasions they were so plentiful as to remind me of my Natal experience in this line, where, in little over four years, I secured 994 species by this means. In the early spring I took a single specimen of *Nyssia hispidaria*, plenty of *Hybernina rupicaprararia*, *H. progemmaria*, *Selenia bilunaria* (*illunaria*), *S. illustraria* (1), and numerous *Tæniocampæ*. Later on during the season my captures were as follows:—*Smerinthus populi*, *Hepialus sylvinus*, *Dasychira pudibunda*, *Calligenia miniata*, *Lithosia griseola*, *L. complanula* and *L. griseola* var. *stramineola*, *Arctia caia*, *Spilosoma menthastri* and *S. lubricipeda* by the score! *Bombyx neustria*, *Odonestis potatoria*, and a single specimen of *Lasiocampa quercifolia*. On my return, in September, I found that *Trichiura cratægi* came in some numbers, unfortunately all worn, but giving me hopes of finding the larvæ next season. Other captures were *Cilix spinula*, *Nola cucullatella*, *Leucania conigera*, *L. comma*, *Hydræcia micacea*, *Axylia putris*, *Xylophasia rurea*, *X. hepatica*, *Neuronina popularis*, *Luperina testacea*, *Mamestra anceps*, *M. persicariæ*, *Grammesia trilinea*, *Caradrina morpheus*, *C. alsines*, *C. blanda*, *C. cubicularis*, *Rusina*

tenebrosa, *Agrotis puta*, *Triphæna ianthina*, *Noctua augur*, *N. plecta*, *N. c-nigrum*, *N. triangulum*, *N. brunnea*, *N. umbrosa*, *N. baia*, *Anchocelis pistacina*, *A. litura*, *Xanthia cerago*, *Hecatera serena*, *Miselia oxyacanthæ*, *Aplecta advena*, *Hadena adusta*, *H. suasa* (1), *H. thalassina*, *Xylina lithoriza*, *Habrostola urticæ*, *H. triplasia*, *Plusia iota*, *Epione apiciaria*, *Eurymene dolobraria* (1), *Pericallia syringaria*, *Odontopera bidentata*, *Crocallis elinguaris*, *Amphidasys betularia*, *Hemerophila abruptaria*, *Cleora lichenaria*, *Geometra vernaria*, *Zonosoma omicronaria*, *Asthena luteata*, *Acidalia scutulata*, *A. osseata*, *A. incanaria*, *A. emarginata*, *A. imitaria*, *Timandra amataria*, *Strenia clathrata*, *Ligdia adustata*, *Eupithecia venosata*, *E. centaureata*, *E. satyrata*, *E. absynthiata*, *E. assimidata*, *E. coronata*, *E. rectangulata*, *Melanthia rubiginata*, *Melanippe procellata*, *Anticlea derivata*, *A. rubidata*, *Coremia propugnata*, *C. unidentaria*, *Phibalapteryx tersata*, *Triphosa dubitata*, *Cidaria miata*, *C. prunata*, *C. pyraliata*, *C. dotata*, *Anaitis plagiata*, very many more common Noctuæ and Geometræ, and numerous Micros. From long experience, I can confidently recommend "light" as an attraction for many species of moths. The conditions for the successful working of light are (1) a wide uninterrupted view, (2) a dark, damp evening, (3) a thoroughly good light, three or four lamps with reflectors being "the thing," (4) no other light near, the consequence being that in the country, where there are no gas-lamps, or, where they exist, are put out at midnight, this mode of collecting can be followed with success nearly all the year, whilst in or near large towns this plan is almost invariably a failure.

Fidonia atomaria occurs on the heathy portions of the Chilterns, and I have taken two specimens so remarkable in appearance that they seemed to be a new species. They have, however, been inspected by some half-dozen entomologists of experience, and the verdict is that they are extraordinary vars. of this species. No. 1 is a male, unicolorous, dark smoky brown, a little darker than the ground colour of *Minoa euphorbiata*. The wings and fringes are exactly alike in tint, and the only other markings are the suspicion of a central lunule on each anterior wing. No. 2 is a female, entirely smoky black.

During a visit to Thrapston, in Northants, I beat dozens of willows without taking a single larva. On my return, on Sept. 8th, I at once set to work to collect autumnal larvæ. I found beating the oaks here to be equally a failure, and the elms seemed only to produce numerous colonies of *P. bucephala*. I then turned my attention to the beech, and was surprised at the difference, for, although the species taken were few, yet their numbers made ample compensation. *Demas coryli* larvæ appeared in numbers; I often beat as many as twenty full-fed larvæ from one beech. Altogether I captured hundreds of this species, most of them having now safely spun up. *Hylophila prasinana* were

also exceedingly numerous, a couple of hundred being beaten. *Lophopteryx camelina* larvæ were likewise in full force. On Sept. 16th, I entered a beech-wood on the borders of Bucks, and in half an hour had beaten 70 larvæ of this species, mostly full-fed. How many more I might have taken I cannot say, for the sound of the beating-stick brought up our entomological enemies—the gamekeepers—who requested me to withdraw. Other larvæ taken have been *Selenia illustraria*, *Odontopera bidentata*, *Drepana unguicula*, *Zonosoma linearia*, all in fair numbers. But my chief capture was a larva of *Stauropus fagi*, from a beech in Crowle Wood. I sleeved it on an apple-tree in my garden, and have now the satisfaction to find that it has changed to a pupa between united leaves.

Imagines of *Eugonia quercinaria* (*angularia*) frequently fell to the beating-stick whilst larva-collecting, and likewise a few fine *X. aurago*. Several specimens of this latter species were too nimble, and easily escaped before they could be safely boxed. I “sugared” for some time in the beech-woods in the hope of obtaining a fine series, but was greatly disappointed; in fact, sugar has been a dead failure here almost the whole of the season. At ivy-bloom the commoner autumn species were fairly represented, but I was unable to bag a single rarity.

Chinnor, Oxon, Nov. 4, 1890.

A PRELIMINARY LIST OF THE INSECT-FAUNA OF MIDDLESEX.

COMPILED BY T. D. A. COCKERELL.

(Continued from vol. xxiii. p. 369).

HYMENOPTERA.

Apidæ.

Panurgus ursinus, Gmel., = *banksianus*, Kby., Hampstead Heath (Smith).

Nomada succincta, Panz., Isleworth (Fenn). *N. lineola*, Panz., Hampstead (Smith). *N. alternata*, Kirb., Isleworth (Fenn and Ckll.). *N. lathburiana*, Kirb., Hampstead (Smith). *N. lateralis*, Sm., Highgate (Smith). *N. ruficornis* var. *signata*, Jur., Hampstead (Smith). *N. borealis*, Zett., Hampstead (Smith). *N. ochrostoma*, Kirb., Hampstead (Smith). *N. ferruginata*, Kirb., Hampstead (Smith). *N. fabriciana*, L., Hampstead (Smith).

Melecta luctuosa, Scop., Hampstead (Smith). *M. armata*, Panz., Isleworth (Fenn).

Cælixys quadridentata, L., Isleworth (Fenn). *C. elongata*, Lep., = *simplex*, Nyl., Isleworth (Fenn).

Megachile maritima, Kirb., Hampstead, once (Smith). *M.*

willughbiella, Kirb., Isleworth (*Fenn*). *M. circumcincta*, Lep., Bedford Park (*Ckll.*). *M. ligniseca*, Kirb., Highgate (*Smith*). *M. centuncularis*, L., Isleworth (*Fenn*), Bedford Park (*Ckll.*).

Anthidium manicatum, L., Isleworth (*Fenn*), Bedford Park (*Ckll.*).

Chelostoma campanularum, Kirb., Bedford Park, one on a flower of *Epilobium hirsutum* (*Ckll.*).

Heriades truncorum, L., Brentford (*Smith*).

Osmia rufa, L., Isleworth (*Fenn*), Bedford Park (*Ckll.*).

O. cœrulescens, L., Isleworth (*Fenn*). *O. fulviventris*, Panz., Hammersmith (*Smith*).

Anthophora retusa, L., Hampstead Heath (*Smith*). *A. pilipes*, Fab., Isleworth (*Fenn*). *A. furcata*, Panz., Brentford (*Smith*). *A. quadrimaculata*, Panz., Kentish Town (*Smith*).

Psithyrus rupestris, Fb., Isleworth (*Fenn*). *P. vestalis*, Fourc., Isleworth (*Fenn*).

Bombus cognatus, Steph., Isleworth (*Fenn*). *B. muscorum*, L., Isleworth (*Fenn*), Bedford Park (*J. W. Horsley, fide Fenn*). *B. latreillellus*, Kirb., Isleworth (*Fenn*). *B. hortorum*, L., Isleworth (*Fenn*). *B. hortorum* var. *harrisellus*, Kirb., Isleworth (*Fenn*). *B. hortorum* var. *c.*, black, end of abdomen grey, Isleworth (*Fenn*). *B. pratorum*, L., Isleworth (*Fenn*), Bedford Park (*Ckll.*). *B. sylvarum*, L., Isleworth (*Fenn*). *B. derhamellus*, Kirb., Isleworth (*Fenn*). *B. lapidarius*, L., Isleworth (*Fenn*), Bedford Park (*Ckll.*). *B. terrestris*, L., Isleworth (*Fenn*), Bedford Park (*Ckll.*).

Apis mellifica, L., Isleworth (*Fenn*), Bedford Park (*Ckll.*). *A. ligustica*, Spin., = *A. fasciata* var., Kirch.; *A. mellifica*, var., Tasch., Isleworth (*Fenn*), Bedford Park (*J. W. Horsley, fide Fenn*): doubtless an introduction.

Vespidæ.

Vespa vulgaris, L., Isleworth (*Fenn*). *V. germanica*, Fb., Isleworth (*Fenn*). *V. rufa*, L., Isleworth (*Fenn*).

Polistes biguttatus, Halid., London Docks (*Smith, Entom.*, 1878, p. 172): an accidental importation from Brazil.

Eumenidæ.

Odynerus lævipes, Shuck., Hampstead (*Smith*). *O. parietum*, L., Bedford Park (*Ckll.*), Bloomsbury (*Brit. Mus.*). *O. antilope*, Panz., Isleworth (*Fenn*). *O. parietinus*, L., Isleworth (*Fenn*), Bedford Park, July 5 (*Ckll.*).

Andrenidæ.

Halictus xanthopus, Kirb., Isleworth (*Fenn*). *H. leucozonius*, Schr., Isleworth (*Fenn*). *H. nitidiusculus*, Kirb., Hampstead Heath (*Smith*). *H. smeathmanellus*, Kirb., Hammersmith, olim (*Smith*).

Andrena cingulata, Fab., Hampstead (*Smith*). *A. albicans*,

Kirb., Isleworth (*Fenn*), Bedford Park (*Ckll.*). *A. atriceps*, Kirb., Hampstead (*S. S. Saunders*, E. M. M., 1875, p. 20). *A. florea*, Fab., Highgate, olim (*Smith*). *A. trimmerana*, Kirb., Isleworth (*Fenn*). *A. trimmerana* var. *spinigera*, Sm., Highgate (*Smith*). *A. cineraria*, L., Hyde Park (*Smith*). *A. thoracica*, Fab., Isleworth (*Ckll.*). *A. nitida*, Fourc., Isleworth (*Fenn*). *A. fulva*, Schr., Isleworth (*Fenn*), Gunnersbury (*Ckll.*). *A. clarkella*, Kirb., Hampstead Heath (*Smith*, p. 124). *A. nigro-ænea*, Kirb., Isleworth (*Fenn*). *A. angustior*, Kirb., Highgate (*Smith*). *A. bucephala*, Steph., Hampstead Heath (*Smith*). *A. albicrus*, Kirb., Hampstead Heath (*Smith*). *A. humilis*, Imh., Hampstead Heath (*Smith*). *A. labialis*, Kirb., Hampstead and Highgate (*Smith*). *A. minutula*, Kirb., Hampstead, on *Veronica* (*Smith*). *A. nana*, Kirb., Isleworth (*Fenn*). *A. afzeliella*, Kirb., Hampstead Heath (*Smith*). *A. afzeliella* var. *fuscata*, Kirb., Hampstead Heath (*Smith*). *A. afzeliella* ab. *convexiuscula*, Kirb., Hampstead Heath (E. M. M., 1875, p. 36). *A. wilkella* var. *xanthura*, Kirb., Hampstead (*Smith*). *A. similis*, Sm., Hampstead (*Enock*, fide *E. Saunders*, E. M. M., 1888, p. 130). *A. conjuncta*, Sm., near Colney Hatch (*Smith*).

Cilissa leporina, Panz., Hampstead Heath (*Smith*).

Crabronidæ.

Crabro podagricus, V. d. Lind., Bedford Park (*D. Allport*). *C. cephalotes*, Panz., Bedford Park (*Ckll.*), Isleworth (*Fenn*).

Nyssonidæ.

Harpactus tumidus, Panz., Hampstead (*Smith*).

Nysson interruptus, Fab., Highgate and Hampstead (*Smith*). *N. trimaculatus*, Rossi, near Colney Hatch (*Smith*). *N. dimidiatus*, Jur., Highgate (*Smith*).

Gorytes campestris var. *fargeii*, Shuck., Highgate (*Smith*).

Mimesidæ.

Mimesa bicolor, Jur., Hampstead (*Smith*). *M. equestris*, Fab., Hampstead Heath (*Smith*).

Pemphredonidæ.

Passalæcus insignis, V. d. Lind., Bedford Park, July 5 (*Ckll.*).

Larridæ.

Trypoxylon figulus, L., Bedford Park, July 5 (*Ckll.*).

Tachytes pectinipes, L., Hampstead Heath (*Smith*).

Astatidæ.

Astata boops, Schr., Hampstead Heath (*Smith*).

(To be continued.)

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

BY F. H. PERRY COSTE, F.C.S.

(Continued from vol. xxiii. p. 374.)

V.—THE CHEMICAL ASPECT (*continued*).

LET us then endeavour, as a first step towards understanding yellow, to analyse the results tabulated on p. 248, and group them into subclasses. Without postulating too rigid a separation, or regarding such subdivisions as other than convenient artificialities, we seem able to distinguish *three* main classes of yellow species. Firstly, those that are utterly unaffected by any reagent; secondly, there is the least exact division, consisting of those species that *are* affected, but slowly and indefinitely, yielding an unsatisfactory sickly whitish, or faded yellowish; thirdly, we have the highly interesting and satisfactory class of yellows that rapidly dissolve and leave a pure white wing; a pigment being indubitably in evidence here. This difference will be more clearly brought out if we tabulate the species in three columns thus (and I take the opportunity of adding, by way of further illustration, the names of a few among the tropical species sent me):—

UNAFFECTED.	UNSATISFACTORILY AFFECTED.	RAPIDLY DISSOLVED.
<i>All metamorphosed reds.</i>	<i>Papilio machaon.</i>	<i>Euchloë cardamines.</i>
<i>Callimorpha hera lutescens.</i>	<i>Vanessa antiopa.</i>	<i>Colias edusa.</i>
<i>Arctia villica.</i>	<i>Gonopteryx rhamni.</i>	<i>Euremia hecabe senegal-</i>
<i>Papilio thoas.</i>	<i>Lycæna alexis.</i>	<i>iensis.</i>
<i>Triphæna pronuba.</i>	<i>Hepialus humuli.</i>	<i>Tœnias nise.</i>
<i>Heliaca tenebrata.</i>	<i>Rumia cratægata.</i>	<i>T. vabella(?).</i>
<i>Catocala palæogama.</i>	<i>Venilia macularia.</i>	<i>Delias hierte and eucharis,</i>
<i>Angerona prunaria.</i>	<i>Camptogramma bilineata.</i>	<i>and one metamorphosed red,</i>
<i>Xanthia silago.</i>	<i>Catocala cerogama.</i>	<i>viz., D. hierte (eucharis).</i>
(The last two or perhaps three not being quite so absolutely unaffected as the others).	<i>Abraxas grossulariata.</i> (This last species would perhaps be almost more justly placed in the third class).	

It thus appears that although I have throughout insisted on yellow being emphatically a pigment colour,* yet the species in

* There is another and somewhat different view as to the nature of these various yellows that ought, perhaps, to be pointed out at any rate. In the earlier stages of my experiments it so happened that I had no specimens of *edusa* or *cardamines* to hand. For a long time, therefore, my knowledge of yellow was derived entirely from those species that are either entirely obdurate, such as *T. pronuba*, or very unsatisfactorily affected, as *G. rhamni*, &c. Add to this the fact that in every red species examined the change stopped at yellow,—which could be in no case further affected,—and it will create no surprise that I was very near concluding yellow to be always an immovable colour; a result as disappointing as unexpected. The first species that opened my eyes was *A. grossulariata*: in this case I found the yellow slowly but completely disappear. This result was so contrary to my previous experience that I carefully repeated the experiments, but with the same result. I thus had forced upon my notice the fact that some yellow *was* sensitive to reagents (a result so strikingly and abundantly confirmed when I came to examine *edusa*, *cardamines*, &c.). Now, if such species as *pronuba* and *rhamni*, on the one hand, be

which yellow is rapidly and satisfactorily affected (dissolved as it happens) are but a small minority of the whole. It is incumbent on me, therefore, to justify my assumption, and to endeavour an explanation of the seeming discrepancy: and it appears to me that one all-important clue may be furnished by the distinction, which I emphasised in section E, between the two kinds of pigment colour, *viz.*, the *soluble* and the *alterable*. Yellow I regard as universally a "solution" pigment, although—paradoxical as the expression may appear—it cannot in the majority of cases be dissolved. The evidence furnished by the behaviour of yellow will be found—as it seems to me—to afford additional and valuable confirmation to my views on this subject, as already explained.*

But here we are confronted by an illustration of the fact, so often alluded to already, that it is impossible to go very far in an experimental investigation without adopting some provisional hypothesis. We cannot even lucidly or connectedly present the actual facts obtained without stringing them on the thread of a working hypothesis; any more than we can orderly arrange a row of beads without a thread to string them on. I will therefore preface our examination into the behaviour of individual yellow species by a statement of the theory that I have been led to form on the subject; merely warning my readers that this theory is at present extremely provisional and hypothetical, and—even so—cannot be rigidly or universally applied.

I assume, then, that the yellow pigment, when first evolved, is exceedingly sensitive and very susceptible of solution by various reagents. We have examples of this stage in several of the Pieridæ, and, still more interestingly, in *Melanargia galatea*, where we can, so to say, actually behold the pigment evolved—and dissolved.

compared with *grossulariata* on the other, it will be noticed that whilst in the former the under side of the wing is a "faded" facsimile of the colour of the upper side, there is in the latter case no sign of yellow below. Seeing, then, that in *grossulariata* the yellow is confined to one side, and on dissolving off leaves the ground colour of pure white, it at first appeared to me that the difference might be attributable to the fact that in one instance the colour was (if I may be allowed to use a somewhat loose and figurative expression) simply "laid on" the upper side; while in the others it—so to speak—"went through" the wing. Such an explanation might, perhaps, be correlated with the statements of Hargen and Wallace ('Tropical Nature,' p. 184) as to *hypodermal* and non-hypodermal colours. Subsequent investigations having, however, given a different turn to my thoughts, I did not follow up this idea (as perhaps I ought to have done), although it suggests considerations that I shall be bound to take into account at a further stage in my work. It still appears to me not impossible that at least a *plausible* case might be made out for this hypothesis, although in the instance of *Colias edusa* one would find a troublesome objection; and since it is not quite clear how far such an hypothesis could be harmonised with, or how far it would be antagonist to, the "development" theory provisionally adopted in the text in explanation of these phenomena, it is certainly incumbent on me to put both views before my readers, that they may be enabled to form their own estimate as to the tenability or otherwise of my explanations.

* See p. 372, above.

After a time (I know not whether years or centuries or yet longer periods) the yellow pigment becomes slightly altered in constitution* (probably accompanied by a greater or less change in tint), and altered in the direction of *greater stability*; or rather, confining ourselves to what we *know*, altered to the extent of becoming far less easily attacked by solvents. Of this stage we have examples in *rhamni* and various other species, as tabulated in column 2. Concerning this secondary change, however, I make no assumption as to whether it is an inevitable sequel of the chemical changes which first led to the development of the yellow pigment, or whether it is an additional and independent development, brought about—as we may suppose—by the agency of Natural Selection; since, whatever biological ends an attractive colour, such as yellow, may serve, we must assume that a distinct advantage would accrue to the species by such colour being rendered more stable and—*possibly* its usual accompaniment—more brilliant.† A question of this sort cannot be settled *a priori*, but only by distinct entomological evidence of *facts*: of facts that is as to the comparative ages of various yellow species; and in saying this I am not oblivious that such facts can only be of the nature of *inferences* from comparative entomology and the study of phylogeny. (But, as I shall show immediately, we have already one criterion—though a fallible one—of comparative age; a criterion, however, that must be used with delicacy and discrimination.) If we found that the most recently developed yellow species are uniformly possessed of a readily soluble pigment, whilst the oldest (I speak always in a phylogenetic sense, of course, and not in an autogenetic) are very difficultly affected, we should then have good reason to assume that a yellow pigment is in its very nature always destined to undergo such further modifications in course of time (or at the very least that—being susceptible of such change—it is certain to be so affected through the agency of Natural Selection). In this light one might regard the behaviour of *E. cardamines*, since the pigment here is readily soluble, and may perhaps be regarded as of (comparatively speaking) very recent development.§ But, on the other hand, there would, I apprehend, be much difficulty in the case of the *Colias* species, which I fancy to be very old established. The subject, however, is a very wide one, and it is out of the question to attempt dealing with it here; but, in quitting it, I will add that I shall be greatly obliged by any direct information bearing on this point, which appears to me both of interest and importance.

* This change might be, for instance, in the direction of higher oxidation.

† It must not be overlooked, however, that *yellow* pigments may in many cases be protective by their resemblance to flowers. Any further evolution towards stability, if entailing also modification of tint, might therefore, in a given species, be fatal, and so checked by Natural Selection.

‡ But *E. cardamines* must not be forgotten, where the colour, though very soluble, is very brilliant.

§ See Darwin, 'Descent of Man,' chap. xi.

Then, thirdly, we have in such species as *A. villica*, *T. pronuba*, &c., examples of the final stage in the evolution of yellow,—the stage when the pigment has become utterly insoluble (in so far, at least, as my reagents are concerned) and very stable.

Now let me show how this explains the phenomenon of the metamorphosed red species. We may explain it from two standpoints,—the chemical or the biological; and at present I do not perceive that we have warranty for pronouncing absolutely in favour of either explanation. Let us take the biological first. We may fairly assume that the evolution of a yellow pigment in a formerly white species is—in its biological significance—a very great advance. Now, without doubt, the further evolution of red from yellow is another important advance, and (in this aspect) would depend upon the “chance” variation of some individuals to a red form, which red, being especially advantageous in some way, would be preserved by Natural Selection. Now, the longer that a species has been yellow the greater is the probability of such fortuitous red variations occurring;* conversely, the newer that the yellow of a species is, the less opportunity has there been given for a variation to red. In this light, then, we would regard the existence of a normally red species as evidence that it had passed through a long, long, period in the yellow stage. But, according to preceding arguments, this is equivalent to saying that the yellow has reached the thoroughly stable and non-sensitive condition, which readily explains why a red colour cannot be retrogressively modified further back than yellow. From the simply chemical standpoint we should ignore the action of Natural Selection as prime agent, and merely say that the metabolic processes that originally led to the formation of yellow pigment, and then to its further modification into a stable yellow, tended to culminate in a red. This interpretation equally supposes a stable yellow as the precursor of the red; so that from whichever standpoint we regard the subject, we must consider the existence of red as a guarantee of the stability of its predeceasing yellow; in either case we have an explanation of the puzzle.

But that the biological explanation (which, of course, equally supposes the susceptibility of yellow to a red-producing change) is safer than the purely chemical seems to me probable, not only from various general considerations (including this, that it is unwise to assume what looks like an “inherent tendency” to progress—at least without strong cause), but also from the fact that the biological explanation can be better harmonised with the exceptional behaviour of *Delias hierte* and *eucharis*; for in these species the modification has been so rapid that the yellow has

* In the concluding part of these articles I shall have occasion to quote a number of instances illustrating this and allied points.

become partly transformed into red, while yet in the *primary unstable stage*.* It would be difficult to exaggerate the interest and importance which these two species possess for me, since their behaviour both furnished the last and important link in the chain of evidence as to the genetic relations of red, yellow, and white; and also showed that the difference between soluble and insoluble yellows was one of degree only, and not of *kind*.

But after emphasising so strongly the interest attaching to these species, I must not quit the subject without a word of description of them and their behaviour. They are white species of Pieridæ; on the under side of the hind wings is a broad patch of yellow, and adjoining this a *red* blotch. So that here we have co-existing the three stages in coloric evolution. Great was the interest with which I experimented. On adding the usual reagents the red was instantly changed to yellow,—that of course; but the question was, what would happen next? I had no need to wait long for an answer; in a very short time the *whole of the yellow was dissolved, leaving a pure white wing*. So at last I had succeeded in finding an instance in which red was changed to yellow, and then that yellow dissolved.

This instance of *Delias* shows, therefore, that although red is usually preceded by a stable yellow, this is not indispensable; red may be evolved direct from an unstable yellow. It would be exceedingly interesting to follow up this subject into its biological bearings did not the urgent limits of space forbid; I must, therefore, defer further speculations on this matter to a possible future period. Three points still remain to be indicated; firstly, that, throughout, the flexible biological explanation, demanding nothing more than the known fact of a yellow *capable* of progressive change, and the action of Natural Selection, which may develop one yellow into a brilliant red and retain another and precisely similar yellow in its initial condition, harmonises far better with the complicated facts than does a rigid and more purely chemical† explanation involving “necessary” developments and “inherent tendencies”: secondly, that regarding the distinction between “soluble” and non-soluble but “alterable” pigments as marking a real difference in constitution, we can understand how, if yellow belong (as it does) to the soluble class, it should be incapable of *alteration* by reagents even when by a slight modification in constitution it has become insoluble; this lessens the difficulty seemingly presented by the unaffected yellow species: thirdly, we have here, in the existence of one or more red species in any genus, the criterion above referred to of the phylogenetic age of all the yellow species of that genus; but the criterion, as

* These are the exceptional instances to which I alluded in the footnote on p. 310.

† This may seem somewhat a misnomer, but I wish to distinguish between the explanation that involves a reference to the totality of the conditions of life, and that which involves the chemical processes of life and nothing more.

already stated, is both fallible and to be applied with discrimination.

We have now to apply this hypothesis (somewhat digressively explained) to the facts presented in our tables.

First of all we will examine instances from the red point of view, and then others from the yellow.

I pass by the species *P. apollo*, *S. ocellatus*, and *Z. filipendulæ*—since I know nothing as to any yellow relatives of these species—with the remark that if any yellow *Parnassius*, *Smerinthus*, or *Zygæna* exist, the yellow would probably be unaltered by any reagents. But in the Arctiidæ and in the genus *Catocala* we have two remarkably interesting sets of phenomena presented, to the which I invite the reader's careful attention.

First, as to Arctiidæ: having found, by so far invariable experience, that a yellow produced by acting on red could be moved no farther, and not having, at that time, excogitated in full detail, any conclusions as to the progressive stability of yellow, as set forth in preceding paragraphs, I was considerably at a loss to bridge over the gulf between the metamorphosed-red yellow and the readily soluble yellow. Now the red of *Arctia caia* and *Callimorpha hera* could—like all other reds—be modified no further back than to yellow; but it occurred to me that if one took a yellow variety of either of these to start with, that yellow might possibly be accessible. I therefore experimented, and with considerable interest, on *C. hera lutescens* but, as the table shows, in vain; *lutescens* was utterly unaffected. Then it occurred to me that, by starting still further back, I might yet be successful. I therefore experimented on *Arctia villica*,—that is, on a normally yellow species,—hoping that the yellow here might be less obdurate than in a yellow variety of a red species. But here again my efforts were useless, for *villica* was practically unaffected. I was therefore forced to abandon my hopes of getting the connected stages from red to pure white within this group of the Arctiidæ; and from the point of view which I have now attained this is quite as it should be.

Next, we will take the case of the *Catocalæ*. The crimson of *C. nupta* is changed to the usual yellow, and of course no farther. Now, among the specimens kindly sent me by Mr. Jones, from America, were two yellow species of *Catocala*,—viz., *C. palæogama* with orange hind wings, and *C. cerogama* with yellow. Thinking it very interesting to have the opportunity of examining, in a second group, the reaction of yellow species related to a known red species, I experimented on *C. palæogama*. The result was just what I expected in accordance with the theory already explained, and by that time familiar to me. The orange of *C. palæogama* was quite unaffected. And here the matter might well have rested; but somehow—I don't exactly know why—it oc-

curred to me to experiment on the second species—*C. cerogama*. The result was very unexpected, and served as another warning to me of the danger in assuming too great a generality or rigidity in the behaviour of these colours. The yellow of *C. cerogama* was by several reagents considerably affected: in no case, it is true, was the pure white of dissolution-phenomena produced, but the result was a very faded yellow; in accord with this fact this species is placed in the second column on page 9. Here, then, in this genus we have the very interesting fact that all stages in the evolution up to red are displayed by actually living species. First of all there are, it seems, species of *Catocala* in N. America without any coloured markings at all;* next we have the type of *C. cerogama* displaying a yellow intermediate in character between the soluble yellows and the thoroughly stable ones: then we have the type of *palægama*, in which the colour has *deepened to orange*—which is wholly unaffected by any reagents: and lastly, we have the *nupta* type, in which the colour has advanced to red with its usual characteristics. It seems to me extremely probable that other species, if examined, might be found to display intermediate stages of behaviour between these.†

The remaining species recorded in this table I may pass lightly over; merely pointing out that in *H. humuli*, which has evolved slight pink markings, the yellow of the ground colour is not dissolved, but simply modified into a "sickly yellowish" (column 2 on p. 9); whilst in *Xanthia silago*, which has somewhat more pronounced reddish markings, the yellow is wholly unaffected. It should also be noted that the pale pink of *Deilephila lineata* does not become yellow so much as "yellowy whitish," a phenomenon pointing perhaps to a partial solution of the pigment: but I am not prepared to discuss this point until I shall have had an opportunity of examining a larger number of pink species (as distinguished from red).‡

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

NOTES FROM MY DIARY.—June 20th.—Went to the Vale of Llangollen, the object being *Sesia scoliiformis*. Stayed at the Chain Bridge Hotel, beyond Llangollen and half-way up the Vale. Sugared in the early

* See Kirby's 'European Butterflies and Moths,' p. 269. I may add, also, that in *C. palægama* the under-side of the fore wings is marked with yellow; so that here we seem to have signs of a still further advance,—though of what use yellow in such a position may be I cannot imagine. Perhaps it is simply a case of correlation. Cf. *Callimorpha hera*.

† I am grievously disappointed that there seems no chance of even re-acting the blue of *fraxini* genetically with the red and yellow of other species: but the case is, I fear, hopeless. See future discussion under *Blue*.

‡ Similar results have lately been obtained with other pink species; these would almost seem to form a separate subclass.

evening, then worked with the net down the left side of the Vale. Took *Melanippe montanata* and *Camptogramma bilineata*. Nearly trod upon a larva of *Odonestis potatoria*, which was requisitioned. Examined the treacle,—result, nothing! June 21st.—Went to the Abbey de Valle Crucis. The curator remembered Ashworth, but had not seen entomologists in the neighbourhood for years. Went to the *S. scoliæformis* wood, on the lower slopes of the Bron Vawr (Big Breast). Had a difficulty with the tenant, which terminated amicably. The slope of the wood (chiefly birch) is at an angle of something like 45°; there is much loose slate from the top of the mountain. Travelling most difficult. There is a legend in connection with this wood, as follows:—"Once upon a time, a well-known entomologist took away *all* the decayed birch trunks, and therefore *all* the *Sesia scoliæformis*." (This brief narrative possibly suggested the story of "The Man in the Moon.") Sticking out of the old birch stumps were pupa-cases (empty) of the *Sesia* family. Living pupæ of *S. culiciformis* had been taken in the neighbourhood about a fortnight before, and the imagines successfully bred. I was too late! I found two sizes, or species, of empty cases,—a small one and a large one; but they might be male and female. Took *M. sociata* var. *subtristata* and *Eubolia plumbaria* in the wood. As no *Sesia* were to be had, we climbed up the Vawr to its crest, the Eglwyseg Rocks, said to be one of the haunts of *Agrotis ashworthii*. Easier getting up than down; in fact the latter was dangerous. One of the party suggested a military "right close" to where the descent was clothed for a couple of hundred feet or more with close, short grass. We then sat down at distances from each other, and using our hands and feet to regulate the speed, &c., came down tobogganin fashion. It was delightful; but, like other delights, brief, for the *débris* was soon reached. In the evening, crossed the railway, and netted along the edge of a birch, oak, &c., wood. Took *Drepana falcatoria* (*falcula*), *Cabera pusaria*, *Melanippe montanata*, *Rumia luteolata* (*cratægata*), and exceptionally large and brilliantly green *Larentia viridaria* (*pectinitaria*). Sugar again useless. June 22nd.—Walked through the fir and oak woods on the Holyhead road to Glyndyfrdwy. Saw our only representative of the "whites." Took *Arctia menthastri* at rest by the wayside; also thirty or forty leaden-coloured Micro-looking larvæ from spun-together heads of St. John's wort. These larvæ all died after reaching Chester. Stretched out along the stem of a garden-rocket (one of the sweetest of flowers) was a caterpillar of, probably, one of the *Taniocampa* tribe. It pupated, June 28th. Lunched at the Berwyn Hotel, Glyndyfrdwy. The hotel is perched high up on the right bank of the Dee. From the lawn in front is a magnificent view over a long, placid, and beautifully wooded stretch of the river. These pools are still navigated, for fishing purposes, by the basket-like *coracle*. Walked back to our hotel again by the road (total, eight miles). Took young larvæ of *Vanessa urticae* from wayside nettles. Also a *D. falcatoria* at rest. Wind, up to date, a gentle breeze from the N.W. Threatened for rain; then showers. In the afternoon, came across, near Llangollen, an *Acidalia*; hoped it might be the rare *A. contiguaria*; turned out to be only a form of *A. aversata*. Also *Asthenes candidata*, *Panagra petraria*, *Acronycta psi*. The last mentioned were exceedingly light in coloration. Sent on traps by last train to Llangollen. Evening wet. The rain was of the species "small"; more like mountain mist. Went to birch and oak wood of the previous evening. Took *Iodis lactearia*, *C. bilineata*, *L. viridaria*,

Xylophasia rurea and var. *combustata*. The two last were plentiful and flying promiscuously. June 23rd.—Up at 5 a.m. to catch the first train from Llangollen. On the landing at the top of the stairs I took a farewell look at a big trout, whose haunt was in the clear depths below; then up at a flock of swifts, which raced and screamed continually to and fro past the window. What a natural rockery: such ferns, and red valerian (the last did not attract a single moth); such trailing, drooping woodbine! Turning away I spied a *Noctua* at rest on the glass. It was a fine specimen of *Plusia pulchrina*. Breakfast. A delightful walk down the Vale to Llangollen amid the changing lights on the mountain tops. These, bathed in heavy dews, were silvered at intervals by the rising sun. June 23rd to July 16th.—From 36 larvæ of *Agrotis ashworthii*, 34 imagines appeared between these dates; 32 out of the 34 were perfect. August 7th.—The Vale of Llangollen again. Ran along by rail with a London friend to Glyndyfrdwy. Worked down the Vale on the left bank of the river to the Chain Bridge Hotel. Well-wooded with high fern-clad grounds, suggesting fritillaries. Hazels abundant; hanging with clusters of nuts. A dull day; saw nothing worth recording. The locality, however, should be well worth working under favourable circumstances. August 8th.—Friend and I went near "The Loggerheads," between Ruthin and Mold. This is scenery that cannot be beaten in North Wales. A hot, sunny day. *Satyrus semele*, *Cænonympha pamphilus*, *Polyommatus phleas*, *Lycæna astrarche*, *L. agestis*, *L. icarus*, unusually abundant. Saw occasionally *Vanessa cardui* and *Epinephele ianira*. Came across hundreds of full-fed *V. io* larvæ on nettles. Said to be a neighbourhood for *A. contiguaria*; another local moth hidden away from extinction.—J. ARKLE; 2, George Street, Chester, September 22, 1890.

ABUNDANCE OF CERTAIN AUTUMN LARVÆ.—One of the most remarkable features of the entomological record of 1890 was the extraordinary abundance of autumn larvæ. In a garden in Norwich, where I was staying during the month of September, everything was infested with larvæ, even to the ferns, which were in many cases almost entirely stripped of their green parts. The many-coloured larvæ of *Orgyia antiqua* (the common vapourer) were by far the most abundant, proving a perfect nuisance by their curious habit of constantly flinging themselves to the ground, from a *Wisteria* arbour which spans the path. What could induce these insects to act in this manner I was unable to ascertain, as there was nothing but an iron garden-seat and the pebbles of the path to tempt them. This falling was not produced by wind or birds, or any other obvious cause, for, during perfect stillness of all their surroundings, they would fall by dozens upon the unfortunate occupants of the garden-chair. Nor is this a habit confined to any particular age or period of the larva's existence, for among those that fell were small, large, and intermediate-sized individuals. Moreover, this habit caused a great mortality among them, for they were no sooner fairly down than they began to make for a white-washed wall which forms one boundary of the path, and attempt to climb up again to the arbour from which they fell. Now it so happened that many small garden spiders had elected to weave their webs from this wall to the iron framework of the arbour, and as the larvæ came to this part of their journey they often became entangled in the webs, were captured, and preyed upon by the small spiders. Is it a usual thing for garden spiders to attack,

conquer, and suck the juices of larvæ many times bigger than themselves? I was the more struck by this procedure on their part as the *antiqua* larva is supposed to be a distasteful morsel to birds and other predatory creatures, owing to the barbed hairs with which it is so abundantly furnished. I also, on one occasion, observed a quarter-grown *antiqua* larva hanging from the same arbour by a long silken thread, up which it was laboriously climbing at the rate of about two feet per hour; this it did by rolling the silk into a ball with its abdominal feet. I never before saw a larva of this species hanging by a silken thread, though I should not be astonished if they had the power to produce them, seeing that they weave a silken pupa-case. The other larvæ which were conspicuous by their numbers were those of various Noctuæ, and of *Spilosoma menthastri*, of which there are always a few in the garden. Larvæ of Rhopalocera were much less abundant than usual. Although I worked diligently, I have been able to procure scarcely any imagines except those of Tortrices, which were fairly abundant.—E. W. CARLIER; 36, London Street, Edinburgh, Oct. 18, 1890.

LARVÆ OF EPHESTIA SP.? FEEDING ON CORK-PACKING IN GRAPE-CASKS.—Some six or more years ago I found in some Almeria grape-casks a number of larvæ feeding on the cork-dust used in packing. They were placed aside, and forgotten. Some months later, looking into the box in which the larvæ had been placed, some dead moths were found; so far as I am able to remember, they were of a darker grey than *Ephestia cahiritella* (*passulella*), and with more distinct transverse lines. Until a few days ago I had not again met with the larvæ; and now I have about a dozen before me, from which I have drawn the following description:—Larva: Three-quarters of an inch in length, pink or whitish pink (the mature larva more pink than that of *E. cahiritella*), with a few whitish hairs; head horn colour; mandibles darker; frontal plate paler, the basal half darker in some examples. Living in cocoons of cork-dust, loose, or attached to the sides of the cask. The larva of *E. cahiritella* forms silk-lined passages through dried currants, and may be found in almost any case of them; there appears to be a constant succession of broods throughout the year. They are flying at the present time in our stores, but are most numerous in the summer months. In the cases with the larvæ may sometimes be found the cocoons of a small black ichneumon. I may add that I obtained a very pretty ichneumon from the first lot of the larva now described.—W. T. PEARCE; 101, Mayfield Road, Seafield, Gosport, November 24, 1890.

PHALERA BUCEPHALA LARVÆ FEEDING ON COMMON LAUREL.—Several records have been made during the past year of larvæ feeding on the common laurel (*Cerasus laurocerasus*). I can add to the list *Phalera bucephala*. A colony of these larvæ, about three-fourths grown, I observed feeding on the above-named plant in July last, at Bickleigh, South Devon. The shrubs were forming a fence to the station-master's garden, which is situated close to the railway station.—G. C. BIGNELL; Stonehouse, Plymouth.

THE CHESHIRE PLAGUE OF CATERPILLARS.—It would appear from Mr. Arkle's remarks (Entom. xxiii. 293) that Cheshire, during the present year, has been almost free from the attacks of "caterpillars," for he states (*l. c.*) "not merely from personal observation, but from exhaustive enquiry,

that no extraordinary appearance of caterpillars has occurred in Cheshire this year." I am sorry Mr. Arkle should have committed so grave an error in making such statements, and that his "exhaustive enquiry" should have been confined to such a small portion, or portions, of Cheshire,—which must have been the case, or he would have arrived at a very different conclusion. For the last four years I have devoted much time to the study of Economic Entomology, and during that period I do not remember having seen certain injurious larvæ so abundant as they have been this year in certain portions of Cheshire.

Nematus ribesii, Curtis, was so abundant in one district, by the end of June, as to have completely defoliated the gooseberry bushes, thereby rendering the fruit useless and destroying the would-be "bearing buds" for the coming season. I am glad to state that this only happened in cases of gross neglect on the part of the owners who took no measures to destroy the larvæ in any shape or form. All the bushes in this particular district were equally attacked; but those who took the precaution to have their bushes beaten about once a week, and the larvæ killed, had excellent crops and plenty of wood left for the future. This was not at all an exceptional case, but I quote it as my own personal observation. Has this Hymenopteron any insect parasites? I have never yet bred any from the larvæ, although I have kept quantities of them. The larva seems to be very nauseous, as the only bird that I have found to feed upon it is the cuckoo (*Cuculus canorus*). In the year 1879, at Upwell, Cambs., I shot two male specimens of this bird, the stomachs of which were quite distended with the larvæ of *N. ribesii*; and last year (1889), on dissecting another specimen of this bird, I found in it many larvæ of *Abraxas grossulariata*. This proves that it is one of the most useful of our insectivorous birds, and, so far, the only British bird known to feed upon nauseous larvæ.

Cheimatobia brumata.—I never remember having seen the larvæ of this insect so abundant here as it was this spring. Almost all kinds of fruit trees suffered more or less from its ravages, especially the apple; many crops of the latter were seriously injured, and in one locality—about two miles from here—the crop was a complete failure, entirely through the ravages of these "looper grubs." In another district the ravages committed by them on a plantation of nut trees were so extensive as to ruin the whole crop. During the last week in October, 1889, the males simply swarmed at the gas-lamps; just outside our city I counted as many as thirty-five individuals on a single lamp. Probably this accounts for the unusual abundance of the larvæ this year. Up to the time of my writing this (Nov. 20th) I have only seen about half-a-dozen males at the "lamps," which is strange, as the weather seems favourable for their development. Are the apterous females attracted by light? I once, in October, 1888, took a female at a gas-lamp, which might have been attracted by the light, or it is just possible that she might have mistaken the lamp-post for a tree trunk. In this county very little seems to be known of this pest of the orchard, consequently nothing is done to keep it in check. "Stick banding" seems to be quite unknown, which is much to be regretted.

Hyponomeuta padellus, Linn.—This web-making pest has favourite localities in this county, which it infests more or less every year. This year it occurred in all its force, especially near Chester, where many bucketsful of the larvæ and their webs were collected and burned.

By the foregoing remarks I do not wish to convey to the reader the

idea that we had a "plague of caterpillars," in the true sense of the word. I only wish to show that some species were unusually abundant here.

I may just mention that the Aphidæ infesting the apple, plum, currant, and rose were never known to be so abundant as they were this year. From what I saw myself I think that the two latter suffered most.—R. NEWSTEAD; Grosvenor Museum, Chester, Nov. 20, 1890.

EMYDIA CRIBRUM.—I think Mr. Fowler rather under-estimates the percentage of males of *E. cribrum* netted by collectors, when he puts it at 60 per cent.; 97 per cent. would be nearer the mark. It may be of interest to note that this insect may be freely taken by "assembling," as we found by the sport which followed the capture of a freshly-emerged female, on the night of the 18th June. Mr. Corbin also tells me that in one night, many years ago, he took over sixty males by this means.—V. GERRARD; 47, Foulden Road, Stoke Newington, N.

CHÆROCAMPA CELERIO FOUND IN A MOUSE-TRAP.—Mr. Esson, of Aberdeen, has sent me a very fine specimen of *C. celerio*, which is supposed to have flown into a shop in Aberdeen, and was found by a boy in a mouse-trap, which had been set with a piece of meat. I may add that, altogether, I have had over twenty specimens of *C. celerio* pass through my hands from time to time. Four of these came from Carlisle; three from Manchester; three from Bolton; two from Doncaster; and one example from each of the following places—Kendal; Preston; Littlehampton; Whalley; Grange; Stockton; Brighton; Aberdeen. In addition to these is one from the collection of the late Mr. B. Standish, without locality.—J. B. HODGKINSON; Ashton-on-Ribble.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—December 3rd, 1890.—The Rt. Hon. Lord Walsingham, M.A., F.R.S., President, in the chair. Mr. Samuel James Capper, F.L.S., of Huyton Park, near Liverpool; and Mr. John Gardner, of 6, Friar Terrace, Hartlepool, were elected Fellows of the Society. Dr. D. Sharp exhibited specimens of *Papilio polites*, *P. erithonius*, and *Euplœa asela*, received from Mr. J. J. Lister, who had caught them on board ship when near Colombo, in November, 1888. Dr. Sharp read a letter from Mr. Lister, in which it was stated that from the ship hundreds of these butterflies were seen flying out to sea against a slight breeze. Many of them, apparently exhausted by a long flight, alighted on the deck of the ship, and large numbers perished in the sea. Lord Walsingham exhibited a coloured drawing of a variety of *Acherontia atropos*, which had been sent to him by Mons. Henri de la Cuisine, of Dijon. He also exhibited specimens of an entomogenous fungus, apparently belonging to the genus *Torrubia*, growing on pupæ, received from Sir Charles Forbes, which had been collected in Mexico by Mr. H. B. James. Mr. M'Lachlan expressed an opinion, in which Mr. C. O. Waterhouse and Mr. G. C. Champion concurred, that the pupæ were those of a species of *Cicada*. Mr. F. D. Godman said that at the meeting of the Society on the 3rd October, 1888, he had exhibited a larva of a *Cicada* with a similar fungoid growth. The specimen was subsequently produced, and the fungus proved to be identical with that on the pupæ shown

by Lord Walsingham. Mr. R. Adkin exhibited male specimens of *Spilosoma mendica*, Clk., bred from ova obtained from a female of the Irish form which had been impregnated by a male of the English form. These specimens were of a dusky white colour, and were intermediate between the English and Irish forms. Mr. F. Merrifield showed samples of a material known as "cork-carpet," and explained its advantages as a lining for cabinets and store-boxes. Dr. Sharp fully endorsed the opinion expressed by Mr. Merrifield. Mr. R. W. Lloyd exhibited specimens of *Anisotoma triepkei*, Schmidt, and *Megacronus inclinans*, Er., collected last August at Loch Alvie by Aviemore. Mr. Merrifield read a paper entitled, "On the conspicuous changes in the markings and colouring of Lepidoptera caused by subjecting the pupæ to different temperature conditions." In this paper it was stated that the results of many experiments made on *Selenia illustraria* and *Ennomos autumnaria* tended to prove that both the markings and colouring of the moths were materially affected by the temperature to which the pupæ were exposed: the markings by long continued exposure before the last active changes; the colouring, chiefly by exposure during these last changes, but before the colouring of the perfect insect began to be visible, a moderately low temperature during this period causing darkness, a high one producing the opposite effect, and two or three days at the right time appearing in some cases sufficient. Dryness or moisture applied during the whole pupal period had little or no effect on either markings or colouring. Applying the facts thus ascertained, Mr. Merrifield said he had obtained from summer pupæ of *illustraria* some moths with summer colouring and spring markings, some with spring markings and spring colouring, and some with summer markings, but an approach to spring colouring. These specimens, with enlarged and coloured photographs of them, were exhibited. Mr. C. Fenn, who said he did not agree with Mr. Merrifield's conclusions, exhibited a very long and varied series of specimens of *Ennomos illustraria*, all of which, he stated, had been bred at the same temperature. He expressed an opinion that the presence or absence of moisture, rather than differences of temperature, was one of the principal causes of variation. The discussion was continued by Lord Walsingham, Colonel Swinhoe, Mr. Waterhouse, Mr. Jenner Weir, Captain Elwes, Mr. M'Lachlan, Mr. Porritt, Dr. Mason, Mr. Barrett, and others. Mr. G. T. Baker read a paper entitled, "Notes on the Lepidoptera collected in Madeira by the late T. Vernon Wollaston." The paper was illustrated by a number of figures drawn and coloured some years ago by Prof. Westwood. Mr. Hamilton H. Druce exhibited several very beautiful species of butterflies, belonging to the genus *Hypochrysops*, from the Solomon Islands and Australia, and read a paper on the subject entitled "A Monograph of the Lycenoid genus *Hypochrysops*, with descriptions of new species." Mr. C. J. Gahan read "Notes on some species of *Diabrotica*."—H. Goss and W. W. FOWLER, *Hon. Secretaries*.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.
—November 27th, 1890.—W. H. Tugwell, Vice-President, in the chair. Mr. R. South exhibited examples of *Melanippe fluctuata*, L., from various localities, and called attention to the var. *costovata* of Haworth, also to an unusually large specimen from Scotland; he also referred to Millière's figure of the variety known as *neapolisata*, and expressed a doubt as to the occurrence of this form in Britain. Mr. Hodges, *Leucania vitellina*,

Hb., taken Sept. 26th, 1890; also specimens of *Caradrina ambigua*, Fb., Isle of Wight, Aug. 1888, and one from Guernsey, Sept. 1890. Mr. R. Adkin, a series of *Spilosoma menthastri*, Esp., bred from ova received from the North of Ireland, the whole of the moths having a distinct brownish tinge of colour, which was common to both sexes, the specimens also varied much in the arrangement of the spots; he remarked that he understood this form was the prevalent one in the district. Mr. Tugwell said that Mr. Adkin's specimens were very similar to those from the neighbourhood of Perth. Mr. Short, series of the two forms of *Lobophora viretata*, Hb., bred from ova received from the Birmingham district, and stated that he occasionally took the species in the North of London. Some discussion took place as to the difference in colour and size of the respective broods. Mr. Short also exhibited three examples of *Spilosoma fuliginosa*, L., from Aberdeen, much larger and paler than those usually received from the north. Mr. Adye, forms of *Anchocelis lunosa*, Haw., from Christchurch, Hants. Mr. Tugwell, insects from New Caledonia; also long series of *Triphæna comes*, Hb., from English and Scotch localities, and extreme forms from Shetland; the series showed considerable variation; and *T. orbona*, Hufn. (*subsequa*, Hb.), which species, the exhibitor remarked, was more stable in colour, and the variation was less decided than in *T. comes*. Mr. Billups, foreign Coleoptera; also numerous species of Diptera, taken by himself during the past season, among which were *Tetanocera ferruginea*, Fen., *T. elata*, Fen., *T. punctulata*, Scop., *Acidia cognata*, W., *A. heraclei*, L., *Palloptera arcuata*, Fen., *Limnia marginata*, F., *Platystoma seminationis*, Fen., &c.

December 11th.—W. H. Tugwell in the chair. Mr. R. Adkin exhibited *Peronia hastiana*, L., bred from larvæ received from the Isle of Man; *Hepialus sylvanus*, L., taken in Kent; and called attention to a peculiar habit of the latter species of hanging from the herbage when in copulâ. Mr. R. South, *Lycæna astrarche*, Bgstr., vars. *allous*, Hb., *salmacis*, St., and *artaxerxes*, Fab.; and made some observations thereon. Mr. Tugwell, long series of *Eupithecia satyrata*, Hb., English and Scotch; also the var. *callunaria*; also several specimens of a *Eupithecia* from Paisley, which Mr. Tugwell said he could not think were referable to *E. satyrata*. Mr. C. G. Barrett expressed an opinion that they were *E. trisignaria*. Mr. Fenn said he had never heard of this species so far north as Scotland. There was considerable discussion relative to this exhibit. Mr. Short, *Epunda lichenea*, Hb., from Portland. Mr. Farrant, a small form of *Hypsipetes sordidata*, Fb., and a Deltoid which he stated was taken in Somerset. Mr. Tugwell expressed an opinion that this species was new to the British list. Mr. South remarked that he had seen the species from Japan; and Mr. Fenn said he had seen something very like it from Jamaica. Mr. T. R. Billups, *Masicera sylvatica*, Fn., bred by Mr. Fenn from the larva of *Saturnia pavonia*, Schiff. Mr. Winkley had also bred the same species from *Pieris brassica*, L.; *Phorocera concinata*, Mg., by Mr. Frohawk from *Vanessa urticae*, L.; *Trixia variegator*, Mg., from *Cheimatobia boreata*, Hb., by Mr. South. Mr. Billups also called attention to three specimens of the rare *Oxycera terminata*, Mg., one of which he had bred from a pupa found in his own garden, Dulwich, August, 1889, the other two being captured in the same locality in August last; he also exhibited several species of Hymenoptera¹ parasitic on the ova of Lepidoptera and Diptera.—H. W. BARKER, Hon. Sec.

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—November 17th, 1890.—Mr. W. G. Blatch, President, in the chair. Mr. M. Stanger Higgs was elected a member of the Society. Mr. H. M. Lee showed *Calocampa vetusta*, *Scopelosoma satellitia*, &c., from Sutton Park. Mr. P. W. Abbott showed a fine series of *Tapinostola fulva*, taken in Sutton Park, flying at night, in the company of *Nonagria arundinis*. Mr. R. C. Bradley showed two varieties of *Abraxas grossulariata*. A discussion followed on the causes of colours in insects, in which Messrs. W. G. Blatch, C. F. Thornehill, R. C. Bradley, and C. J. Wainwright joined. Mr. C. J. Wainwright showed several wings of *Selenia tetralunaria* denuded of scales, one of which lacked half of one longitudinal vein. A discussion followed, in which Messrs. Blatch, Thornehill, and Wainwright joined. Mr. Blatch mentioned a curious case of a specimen of *Habrostola urticae*, which had the body filled with scales like those on the wings. Rev. C. F. Thornehill showed a collection of Lepidoptera, made at Abbott's Wood in June, 1890, and made remarks on them.

December 1st, 1890.—Mr. W. G. Blatch, President, in the chair. Mr. Blatch reported that, during 1890, he had taken sixty species of beetles new to the Midlands. Messrs. C. F. Thornehill, R. C. Bradley, W. Harrison, G. W. Wynn, and A. Johnson showed collections of insects taken during 1890. Mr. Thornehill's included a specimen of *Scotosia certata*, taken on 8th September, and seeming, therefore, to point to a second brood of the species. Mr. G. T. Baker showed a collection of butterflies, taken in the Madeira Islands. Mr. C. J. Wainwright showed *Cosmia affinis* and *diffinis*, taken from near Bromsgrove.—C. J. WAINWRIGHT, *Hon. Sec.*

LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY.—Monday, November 10th.—The President, Mr. S. J. Capper, in the chair. Mr. E. C. Stott was elected a member. Referring to Miss Ormerod's new 'Manual of Injurious Insects,' a copy of which the authoress had presented to the Society, the President said that the volume had been greatly enlarged since the last edition. It contained a large number of new figures, and remarks on twenty new insects, which had been found to be injurious to crops since the last edition was published. There was also a portrait of Miss Ormerod; and he recommended all interested in economic entomology to procure a copy. Mr. J. Cosmo Melvill read a paper on "*Hypocephalus armatus* (Desin.), the rarest and most extraordinary member of the Coleoptera," giving an account of its structure and probable affinities, and exhibited one of the nine specimens known to exist in collections; also various members of other families, with which *H. armatus* had been compared. During the conversazione, the President exhibited some fine varieties of *Abraxas grossulariata*; Mr. Newstead, *Acherontia atropos*, large nests of wasps, and the only three specimens known of a Coccid, *Orthezia occidentalis*, sent him for figuring by Mr. J. W. Douglas; Mr. Gardner showed Goedart's 'Metamorphosis et Historia Naturalis Insectorum,' A.D. 1662; Rev. H. H. Higgins exhibited *Apatura pavoni*; and Mr. C. S. Gregson, 100 varieties of *Abraxas grossulariata*, picked out of 4000 specimens bred by him in 1890.

Monday, December 8th.—The President in the chair. Mr. B. H. Crabtree was elected a member. Mr. R. Newstead read a paper on "British Wasps, their parasites and scavengers," in which he gave the life-history of the wasp, from the commencement of the nest by the single

queen to the complete formation of the colony, and enumerated twenty-two species of insects, which he had found inhabiting these nests. The paper was fully illustrated with specimens and diagrams. The President exhibited *Acidalia immorata*, from Lewes. Mr. Gregson, cases of *Articulatæ*, showing manipulation before being presentable at public and private museums. Mr. Sydney Webb, his two specimens of *Plusia moneta*. Mr. Beschorner, foreign *Papilios*. Mr. Stott, a very variable series of *Charæas graminis*. Mr. P. Schill, *Parnassius apollo* and *P. phæbus*, from Switzerland; also specimens of *Papilio machaon*, showing the marked difference between English and Swiss examples of this species.—F. N. PIERCE, *Hon. Sec.*

OBITUARY.

MR. FRAZER S. CRAWFORD, of Adelaide, South Australia, died October 30th, 1890, in the 61st year of his age. He was an expert photographer, and held the position of photo-lithographer to the Survey Department; but he also discharged the duties of another office in the Government service, *viz.*, that of Inspector of Vine and Fruit Pests. "His demise is a very great loss to the whole of the Australian Colonies, and to the branches of scientific investigation in which he has rendered such great service during the later years of his life. Southern Californians have to thank him for ridding them of the *Icerya purchasi*, which already had nearly ruined a large number of their horticulturists; and Australians, especially South Australians, owe his memory a deep debt of gratitude for his researches into and advice concerning the codlin moth (*Carpocapsa pomonella*), apple and pear 'scab,' and a host of other insect and fungus pests which have afflicted them." The above information and extract is from the Australian 'Garden and Field,' kindly communicated by Miss Eleanor A. Ormerod, who wrote of the deceased as follows:—"Mr. Molineux' obituary notice of Mr. Crawford conveys some idea of his work, but not of the important aid that he gave as a referee and co-operator in investigations as to the history and prevention of attacks which, like that of *Icerya purchasi*, affected the welfare both of Australasia and the U.S.A. Up to the time of his decease, he paid especial attention to the parasites of this wide-spread pest, and his skill as a photographer was utilised with great benefit to his correspondents in illustration of his observations. He was especially on the watch to guard against the introduction of insect infestations into the colony of which he was the entomological care-taker, and from my many years' correspondence with him, I have personal knowledge of the prompt and conscientious exactness with which he devoted himself to such work. He at once procured the most trustworthy information, and brought it forward officially. As a co-operator in such parts of my own work as affected both home and colonial service he was invaluable,—never grudging trouble, or the hardly-pressed time he could so ill spare, to look into the accuracy and serviceableness of every point. During the latter months of his life, when from the increase of his illness the use of crutches had become necessary, he still continued at work, and may truly be said to have died in harness."

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REMARKS ON *MIANA STRIGILIS*, *M. FASCIUNCULA* AND A PROBABLE NEW SPECIES OF THE GENUS.

BY RICHARD SOUTH.

IN 1881 I secured a long and variable series of *Miana strigilis* in North Devonshire. Comprised in this series were several specimens which I considered to be merely forms of *M. strigilis*; some of these examples have been sent to correspondents, and at the present time I have but three of them in my collection. Probably these would have continued to grace my series of *M. strigilis* if the suggested identity of that species and *M. fasciuncula* had not aroused my dormant interest in *Miana*, and induced me to look with a critical eye at my series of the two species in question.

The first point upon which I satisfied myself was that confusion of *M. fasciuncula* with *M. strigilis*, or *vice versa*, was not possible to anyone who would make himself acquainted with the differential characters of these well known and distinct species. My series of each species comprises detachments from several British localities, and careful examination of these has enabled me to tabulate the differences between the two species as follows:—

	<i>M. strigilis.</i>	<i>M. fasciuncula.</i>
1. Abbreviated basal line*	distinct	indistinct or absent
2. Area between base and 1st line, and that between 2nd and sub- marginal lines	differently coloured.....	similar in colour
3. Claviform stigma.....		
	large and distinctly outlined in black	inconspicuous and often entirely absent
4. Under surface	some shade of grey suffused with fuliginous	some shade of ochreous suffused with fuliginous

* Transverse markings are absorbed by the dark ground colour of var. *æthiops*.

Apart, however, from the differences to be found in the markings, the two species are easily separable by other characters alone. Thus, in proportion to the respective length of their fore wings, we find that the thorax of *strigilis* is much narrower than that of *M. fasciuncula* and the latter is not crested. Both sexes of *M. strigilis* have distinct dorsal tufts on the body, but in *M. fasciuncula* these tufts are only found in the male, and are very insignificant even in that sex.

Having convinced myself of the distinctness of these two species, it now remained for me to determine the position of the three specimens I had so long regarded as varieties of *M. strigilis*. Examination of these specimens, which on former occasions when I had looked at them I am bound to confess had been only superficial, was now careful and minute. The result is that I find the specimens are not identical with either *M. strigilis* or *M. fasciuncula*. Neither can they be considered forms intermediate between those two species.

Although very similar to forms of *M. fasciuncula* in colour of ground and markings of fore wings, they can be separated at once from that species by the *strigilis*-like dorsal tufts on the body. It was chiefly owing to the presence of these dorsal tufts, that I supposed the specimens to be aberrations of *M. strigilis*, but they are larger than any example of that species I have ever seen and altogether more robust; the nervures are thicker; the first transverse line is decidedly curved, not unlike the same line in *M. literosa*, and the basal area is more uniformly coloured. I am inclined to think that these pseudo-*strigilis* are forms of a distinct species which so far has been overlooked, and shall be pleased to hear from anyone who may have specimens of a *Miana* which he cannot reconcile with either of the known European species or forms.

THE HABITS AND LIFE-HISTORY OF THE NEW ZEALAND GLOW-WORM.*

By G. V. HUDSON, F.E.S.

My first attempt to discover the nature of the New Zealand glow-worm was in January, 1885, when I captured several specimens and recorded them as dipterous larvæ, but, through pressure of other work, did not figure or carefully examine them.

Exactly a year later I had the insect again brought under my notice during a conversation with Mr. E. Meyrick, who told me that he had written a short note on the animal, which is quoted in full in my previous paper (Trans. Well. Phil. Soc. vol. xix., page 62). He stated, as his opinion, that the larva was referable to one of the

* Read before the Wellington Philosophical Society, October 8th, 1890.

Staphylinidæ (Coleoptera), and carnivorous. The light he considered attracted, and the web entangled, minute insects on which he supposed the larva to feed. It will be seen that his supposition as to the nature of the insect is entirely contradicted by subsequent investigation, whilst the latter conjecture has not in any way been corroborated, as we are still entirely in the dark as to the use of either the web or the light to the larva.

During February and March, 1886, I instituted very careful observations on the larvæ, keeping several specimens in captivity. From these I ascertained that the light was not exhibited at all regularly, sometimes being brightest at night and sometimes in the early morning hours. I have since noticed that, in the natural state, the larvæ shine most brilliantly on dark, damp nights with a light N.W. wind.

The web referred to above is suspended in a rocky or earthy niche in the banks of a stream, in the densest parts of the forest. It consists of a thick glutinous thread stretched across the niche, and supported by several smaller threads running right and left, and attached to the sides and end of the cavity. On this the larva invariably rests, but, when disturbed, immediately glides back along the main thread, and retreats into a hole which it has provided at the end of it. From the lower side of this central thread numerous smaller threads hang down, and are always covered with little globules of water, resembling a number of minute silver-beaded necklaces, constituting a conspicuous—though apparently unimportant—portion of the insect's web. It should be mentioned that all these threads are constructed by the larva from a sticky mucus exuded from the mouth.

The organ which emits the light is situated at the posterior extremity of the larva, and is a gelatinous and semi-transparent structure, capable of a great diversity of form. It can be withdrawn or extended at the will of the larva, which, however, can immediately cease to shine without withdrawing it. This action is most likely effected by shutting off the air from the tracheæ ramifying through the "light organ," which being, no doubt, largely composed of phosphorus only, becomes luminous when in contact with the oxygen in the air-tubes. Larvæ cease to shine on very cold nights, in the daytime, and in a room which is artificially lighted.

During my observations in 1886 one of the larvæ disappeared, and I naturally assumed that it had buried itself in the earth, and was undergoing its transformation into the pupa state. This was apparently confirmed by the emergence, in about a month's time, of a fly, which was afterwards identified by Baron Osten-Sacken as *Trimicra pilipes*, the larva of which is well known and has nothing to do with the present insect. It is most unfortunate that a larva of this *Trimicra* should have got into the breeding-cage without my knowing it, and thus deceived me.

Further investigations were instituted at the end of 1886, when I discovered a luminous pupa suspended in one of the webs, which I have since several times reared from the glow-worm, and which is consequently the real pupa. It is a curious animal, and furnished with a large process on the back of the thorax, which is attached to the web, and holds the pupa suspended in the middle of the niche previously inhabited by the larva. The light is emitted from the posterior segment of the pupa, but is much fainter than in the larva, and a distinct organ is not apparent. It is frequently suppressed for days together. This pupa died in a few days, and all the larvæ then under observation also died.

Larvæ were again procured in August, 1888, but this time I did not succeed in getting any of them as far as the pupa stage. I should mention that the larvæ are only to be obtained by walking up the bed of the stream, in the big gully of the Botanical Gardens, at night, with a bull's-eye lantern. A piece of thin stick is rapidly introduced behind the larva, as soon as it is detected, which always adheres to it, and is thus taken away, web and all, and carried home in a tin box, with damp moss, &c.

On September 1st, 1888, I obtained another supply of larvæ, placing them this time in a large bell-glass, with stones and ferns, the bottom of the glass having about one inch of water in it: this I conceived would closely resemble their natural habitat. During all my expeditions I always examined a great number of the webs, and could never find any remains of insects entangled. I also noticed that the largest larvæ were always concealed in the deepest niches in the bank, and frequently behind large cobwebs, where they would stand a poor chance of capturing insects. I also think that there must be a very great mortality among the larvæ, judging from the number of minute ones always observed, in natural conditions, compared with large ones. On December 21st I found that two of the larvæ had changed into pupæ resembling the one I found two years before. These unfortunately became mouldy, and died; and it was not until the following April that I succeeded in rearing the true fly, which I discovered, on the morning of the 4th, standing beside its old pupa-skin. Two enlarged drawings were then made, and forwarded to Mr. Skuse, of Sydney, and Baron Osten-Sacken, of Heidelberg, Germany. Both these gentlemen had been previously furnished with specimens of the larvæ in alcohol. They then expressed their opinion that the fly, of which I sent a drawing, probably did *not* result from the luminous larva, and that it would be desirable to postpone publication until another specimen had been reared. Convinced though I was of the accuracy of the observation of April 4th, I determined to verify it, and again procured larvæ, which all died. On July 10th, 1890, I got about twenty large larvæ, spending upwards of three hours in the bed of the stream: two of these changed during August into pupæ, one of which died, but the

other gave rise to another fly exactly resembling the one reared on April 4th, 1889. The circumstances connected with the emergence of this fly are so entirely conclusive that it may perhaps be well to relate them in detail. On examining the pupa at 8 a.m., on the 14th, I observed that it had become much paler in colour. At 2 p.m. I noticed the fly perched on it, with its head down towards the tail of the pupa, *and the extremity of the abdomen of the fly still within the pupa-skin.* In this position it remained until the following day at 5 p.m., when I transferred the fly into a large glass-topped pill-box, which I placed on the table in my sitting-room. On returning to the room at 7 p.m. without a lamp, I was astonished to see the inside of the box brilliantly lit up, the extremity of the fly's abdomen giving out a strong light, about half as bright as that emitted by a full-grown larva. The whole phenomena relating to the emergence of this fly from the pupa, and its subsequent luminosity, were also observed by my brother, who was present at the time, and can fully corroborate these statements if necessary. As this was a female fly I decided to take her up into the big gully in the gardens, where the larvæ are abundant, and see if she would attract males. As soon as I arrived I put the box down in the bed of the stream, and the fly immediately lit up so as to again strongly illuminate the inside of the box. There were lots of larvæ all round, so that I considered it likely there were also flies. After thirty-five minutes I visited the box, but found nothing had arrived. I then left her for ten minutes more, and returned with the same result. During this expedition I again carefully examined many webs of the larvæ, and took a quantity of the mucus from them home, and examined it with the microscope. I could, however, find no trace of insects entangled or their remains. I am quite at a loss to explain either the light or the web, also the food of the larva. I must leave these points for future investigation.

I should mention that the flies reared on April 4th, 1889, and Sept. 14th, 1890, were both females, as it is conceivable that this may have an important bearing on future inquiry as to the use of the light.

A PRELIMINARY LIST OF THE INSECT-FAUNA OF MIDDLESEX.

COMPILED BY T. D. A. COCKERELL.

(Continued from p. 8).

SINCE the first part of the list was written, a good many new records have come to hand, the additional sources of information being as follows:—

(9.) A. Bacot. A MS. list of 77 Lepidoptera, taken by Mr. Bacot, his brother, and Mr. A. Campling, within a radius of a

mile from Clapton Station, but on the Middlesex side of the River Lea. The Rhopalocera were mostly caught five or six years ago, but the rest, with the exception of *C. elpenor*, within the last two years.

(10.) A. V. Legros. A MS. list of 114 Coleoptera, taken at Hanwell and other localities.

(11.) Louis B. Prout. A MS. list of Lepidoptera, taken in the Stamford Hill and Tottenham district, at Clapton, and at Tottenham.

12.) There is in the British Museum a most interesting collection of insects, all taken within the precincts of the Museum at Bloomsbury. Many species were taken which are not in this collection, but these are all represented by labels, as Mr. Waterhouse kindly informed me. I have therefore catalogued all the labels as well as the insects in this collection, the result being 305 Coleoptera, 7 Lepidoptera, 2 Hymenoptera, and one Dipteron. The collection makes no attempt to be complete except as regards the Coleoptera, but the number and interest of the beetles found in such an unpromising-looking locality as Bloomsbury is amazing. Concerning some of these beetles, see Mr. E. Waterhouse, in Ent. Mo. Mag., vol. ii. pp. 13, 14 (1865).

(13.) J. C. Melvill. 'The Flora of Harrow,' New Edition, edited by Rev. W. M. Hind. With notices of the birds of the neighbourhood and of the butterflies and moths. (1867).

LEPIDOPTERA.

Papilionidæ.

Papilio machaon, L., "Once seen in Whitton Park," Isleworth (E. O. Meyers). Newman gives a Middlesex record in his 'British Butterflies,' p. 153.

Aporia crataegi, L., "Isleworth," reported to Mr. Fenn by Mr. E. O. Myers. I know nothing further about the record.

Pieris brassicæ, L., Clapton (Bacot) generally common (Godwin), Mill Hill (South), Dalston (Prout), Isleworth (Fenn), Bedford Park (C. R. Fenn). *P. rapæ*, L., Clapton (Bacot), generally common (Godwin), Mill Hill (South), Dalston (Prout), Isleworth (Fenn), Bedford Park (Ckll.). *P. napi*, L., Clapton (Bacot), Kingsbury, Old Oak Common (Godwin), Mill Hill (South), Dalston (Prout), Isleworth (Meyers), Bedford Park (J. Gray).

Euchloë cardamines, L., Old Oak Common (Godwin), Mill Hill (South), Stamford Hill and Tottenham district (Prout), Isleworth (Meyers), Bedford Park, (Miss E. Sharpe).

Colias edusa, Fb., Clapton (Bacot). Generally common in 1867 (Godwin), one in 1875, very abundant in 1877, two bred from larvæ in 1877, at Mill Hill (South), Isleworth (Meyers), Bedford Park, in 1884 (J. Gray). *C. edusa* var. *helice*, Hb., West End Lane, Kilburn (Godwin). *C. edusa* ab. *duplex*, Ckll., Enfield,

1877; Finchley, 1876; see Entom. 1878, p. 52, and coloured figs.; Entom. 1889, p. 6.

Gonopteryx rhamni, L., Bishop's Wood, Hampstead; Old Oak Common, Kingsbury (Godwin); gardens and railway banks, Mill Hill (South), Dalston (Prout), Isleworth (Fenn and Ckll.), Bedford Park (J. Gray).

*Nymphalidæ.**

Argynnis (Brenthis) selene, Schiff., "Isleworth" (Meyers, reported to F. Fenn). There is also a Middlesex record in Newman. *A. adippe*, L., Isleworth (C. R. Fenn). *A. paphia*, L., "Enfield Chace, Enfield" (W. P. Ellis, Pract. Nat. 1883, p. 131). See also Henry Walker, Nat. Hist. Notes, 1882, p. 4. *A. aglaia*, L., "Enfield Chace, Enfield" (W. P. Ellis, l. c.)

Melitæa aurinia, Rott., Kingsbury (F. Bond, in Newman, Brit. But. p. 42).

Grapta c-album, L., "Isleworth" (Meyers), near Edgware (F. Bond, in Newman).

Vanessa polychloros, L., Kingsbury, rare (Godwin); Mill Hill, common in 1876, pupæ under branches of fruit-trees (South). *V. urticæ*, L., Clapton (Bacot), Mill Hill (South), generally common (Godwin), Dalston (Prout), Isleworth (Fenn), Bedford Park (Ckll.). *V. io*, L., Clapton (Bacot), Mill Hill (South), generally common (Godwin), Dalston (Prout), Isleworth (E. M. Fenn), Bedford Park, 1886 (L. M. Cockerell), and Sept. 1st, 1890 (Ckll.). *V. antiopa*, L. There is a record in the 'Flora of Harrow, and it is reported from the New River (F. A. Walker, Entom., 1887, p. 177), and near Kinsbury (F. Bond, 'Zoologist,' 1847, p. 1791).

Pyrameis atalanta, L., Clapton (Bacot), Kingsbury, generally common (Godwin), Mill Hill (South), Isleworth (Fenn). *P. atalanta* ab. b., the red band on upper surface of primaries nearly divided in two a little below its middle. Bedford Park (Ckll.). *P. cardui*, L., Clapton (Bacot); generally common, but scarce some years (Godwin); Mill Hill, observed June, 1877, for the first time, two worn specimens (South); Dalston (Prout), Isleworth (Fenn), Bedford Park, imago (J. Gray), and a larva on *Cnicus arvensis*, July 12th, 1885 (Ckll.).

Limenitis sibylla, L., Mill Hill one recorded in Entom. 1874 (South).

Apatura iris, L., Caen Wood, near Hampstead (J. F. Stephens, see Newman, p. 76).

Melanargia galatea, L., Mill Hill, railway bank, 1875; two in orchard, 1876 (South).

Pararge megæra, L., Clapton (Bacot); edge of Bishop's Wood, Hampstead (Godwin), Mill Hill (South), Isleworth (Meyers).

Satyrus semele, L., recorded in the 'Flora of Harrow.'

* Including, as subfamilies, *Apaturinæ* and *Satyrinæ*.

Epinephele ianira, L., Mill Hill (South), Clapton (Bacot), Old Oak Common, in profusion (Godwin), Dalston (Prout), Isleworth (Fenn), near Ealing (Ckll.). *E. tithonus*, L., Clapton (Bacot), Mill Hill (South). *E. hyperanthes*, L., "Isleworth" (Meyers).

Cœnonympa pamphilus, L., Clapton (Bacot), generally common (Godwin), Mill Hill (South).

Lycenidæ.

Thecla rubi, L., one example, Acton Lane, Acton side of Old Oak Common (Godwin). *T. quercus*, L., Mill Hill, one larva beaten from oak in the garden (South).

Chrysophanus phlœas, L., Clapton (Bacot), Mill Hill (South), generally common (Godwin), Stamford Hill, &c., district (Prout), Isleworth (Fenn), Bedford Park (J. Gray and L. M. Cockerell). *C. phlœas* ab. *fasciatus*, Ckll., Finchley (W. P. Weston), see Entom. 1878, p. 25, and 1889, p. 99.

Lycæna ægon, Schiff., Scratch Wood (F. Bond in Newman. *L. astrarche*, Bgstr., one in a field near farm, Mill Hill, 1875 (South); "Isleworth" (Meyers). *L. icarus*, Rott., generally common (Godwin), Mill Hill (South), Clapton (Bacot), Dalston (Prout), Isleworth (C. R. Fenn), Bedford Park (Ckll.). *L. corydon*, Fb., Old Oak Common, one example, end of July, about 1869 (Godwin). *L. argiolus*, L., Hampstead Heath, three specimens (Godwin), Mill Hill (South).

Hesperidæ.

Syrichthus malvæ, L., Old Oak Common, Kingsbury; foot of Hampstead Heath, towards Hendon; Dolton Hill (Godwin), Mill Hill, in a hollow at the back of Bunn's Farm (South). *S. malvæ* var. *taras*, Meig., four or five at Old Oak Common, smaller than type (Godwin).

Pamphila thaumas, Hufn., Old Oak Common (Godwin), Isleworth (Meyers). *P. sylvanus*, Esp., Old Oak Common (Godwin), Mill Hill, on the common (South). *P. comma*, L., Old Oak Common (Godwin).

Sphingidæ.

Acherontia atropos, L., Mill Hill, one pupa found (South), Isleworth (E. O. Meyers).

Sphinx convolvuli, L., Mill Hill, two netted, flying over flowers (South); Blenheim Passage, St. John's Wood, in 1869, one specimen (Godwin); Bedford Park, one specimen in 1885 (F. Nash), Isleworth (Meyers). *S. ligustri*, L., Mill Hill, larva on privet (South); generally common (Godwin); Woodstock Road, Bedford Park (Fenn) Isleworth (Meyers); larvæ common at Ealing, 1879 (R. South).

Deilephila galii, Schiff., see Entom. 1888. p. 210 and p. 274.

Chærocampa nerii, L., see Entom. 1888, pp. 258 and 265, and 1889, p. 120. *C. porcellus*, L., Mill Hill, two specimens (South). *C. elpenor*, L., Clapton, about fifteen years ago (Bacot).

Smerinthus ocellatus, L., Hampstead Heath and Kingsbury (Godwin); Mill Hill, larvæ rather common on apple, sallow, and willow (South); Bloomsbury (Brit. Mus.), Bedford Park (J. Gray), Isleworth (Meyers). *S. populi*, L., generally common (Godwin), Mill Hill, larvæ on poplar (South), Bloomsbury (Brit. Mus.), Bedford Park (L. M. Cockerell and J. Gray), Stamford Hill and Tottenham district (Prout), Clapton (Bacot); St. John's Wood, sometime common, especially in larval stage (South); Isleworth (Meyers). *S. tilia*, L., The Butts, Brentford, a larva under a lime tree, Aug., 1890 (Fenn); Clapton (Bacot), generally common (Godwin); Mill Hill, larvæ on elm, also pupæ, elm (South); Bedford Park (J. Gray); Isleworth (Meyers); St. John's Wood, some years larvæ not uncommon, imago not often seen (South).

Macroglossa stellatarum, L., Mill Hill, several (South); moderately common (Godwin), Isleworth (Meyers), St. John's Wood, several times seen (South).

Hemaris fuciformis, L., Westbourne Park Station (H. Walker, Nat. Hist. Notes, 1882, p. 4). The occurrence of this insect in London is explained by the supposition that it had flown on to an up train somewhere, and thus been carried to town. The genus *Hemaris*, Dalman (1816), seems a well-defined one, as distinct from *Macroglossa*, Och. (Should not this be *Macroglossum*, Scop., 1777?).

It is intended next to treat of the following groups:—

Lepidoptera: *Sesiidæ*, *Zygænidæ*, *Bombyces*, *Pterophori*. Coleoptera: *Aleocharinæ*, *Longicornia*, *Chrysomelidæ*, Diptera: *Syrphidæ*. Information about any of these will be gladly received.*

In some instances above I have given only the name of the collector as authority, contrary to my first intention. This is done in the case of several Bedford Park insects, some of which were not identified or recorded by the collectors themselves.

(To be continued.)

NOTES ON BRITISH LEPIDOPTERA; EXTRACTED FROM CONTINENTAL JOURNALS.

By W. WARREN, M.A., F.E.S.

In the 'Stettiner Entomologische Zeitung' for 1890, January to June, there occur some notices of Micro-Lepidoptera, the perusal of which should, I think, be of interest to British collectors. The extracts here given are, it must be understood, a condensed summary of the chief items of information.

* Records may be sent to the compiler, at 3, Fairfax Road, Bedford Park Chiswick, W.

On pp. 48 and 49 there are described, by Herr C. A. Teich, of Riga, two new varieties of *Penthina* (*Sericoris*), viz., *P. rivulana*, Scop., var. *stangeana*, and *P. lacunana*, Scop., var. *hoffmanniana*, both of which occur along the shores of the Baltic. The first of these, var. *stangeana*, differs from the type form by (i) its smaller size (13—14 mm. against 16—18 mm.); (ii) its darker colour (brownish black with olive dusting, instead of olive with black dusting); (iii) the dulness of the silvery lines; and (iv) the deeper tint of the hind wings, and under side generally. The other var., *hoffmanniana*, differs likewise from the typical form of *P. lacunana* (i) in point of size (13—15 mm. against 18 mm.); (ii) in its brighter tints (the cross-bands being pale yellowish white, not so much dusted with darker as in the stem form, and with their central metallic line brighter blue); (iii) in having the submarginal dark shade, which runs from the apex to the inner margin, divided by an elbowed pale line, starting from the penultimate gemination; (iv) in having the hind wings and under side darker. This form appears to me to be identical with our Cambridgeshire fen specimens, which, however, are not smaller than the usual examples of *lacunana*.

On p. 53 we find some remarks on larvæ of Micro-Lepidoptera, by Herr F. Eppelsheim, of Grünstadt, some of which are decidedly interesting:—

Perinephele lancealis (the long-winged pearl).—"Larva stated to occur, viii. e., ix. b., on the under side of rolled leaves of *Teucrium scorodonium*." The only plant, hitherto, I believe, given for this larva is *Eupatorium cannabinum*, on which it always feeds in England.

Acrobasis sodalella.—"Larva on oak in the second half of May, earlier than its two allies, *consociella* and *tumidella*. Its mode of feeding differs; instead of spinning the oak leaves flatly together, as the other two species both do, it makes a cluster of them. The larva itself is described as striped with brownish black and white, the stripes being of uniform width, and the dorsal one brown; head black, with yellow speckles; thoracic segment shining black, with a white edge in front; anal flap and hind legs of the ground colour; fore legs black. Imago emerges from the second half of June, onwards."

Homœosoma cretacella, Rössler (= *senecionis*, Vaughan).—"Larva in heads of species of *Senecio*, drawing several flower-heads together with a web, mixed with excrement; differing therein from the larva of *H. nimbella*, which bores into a single flower, and remains concealed therein, the only indications of its presence being the protrusion of some of the dislodged florets."

Conchylis (*Eupœcilia*) *ambiguella*.—"Additional food-plants recorded: Red currant and snowball (*Symphoricarpos racemosus*), in the fruit and berry; *Dianthus carthusianorum*, in the seed-heads."

At p. 57, Herr H. Disqué, of Speier-on-the Rhine, gives a description of the larvæ of *Psamotis pulveralis*, Hüb., and *Acentropus niveus*, Ollivier:—

Psamotis pulveralis.—"Larva: ground colour grey, with violet-red stripes; six black white-rimmed warts on each segment; head marbled, dark and light brown; thoracic segment black, divided down the middle, where it is paler; anal segment pale brown. A female, taken in the beginning of August, laid eggs, which hatched in about a fortnight's time, and produced three imagos at the end of September; these were bred in-doors. The majority of the larvæ died through being kept too dry." Is there, under *natural* conditions, a regular second brood? Can the Folkestone collectors answer?

Acentropus niveus.—"Larva with sixteen feet; dirty whitish; head and thoracic segment inclining to yellowish; the 4th to 8th segments clouded, laterally, with brownish. Living free, on leaves, or enclosed, like the pupæ, in a whitish web, on *Ceratophyllum demersum*. Of gills, through which the larvæ are said to breathe, no traces were to be seen. Except for size, they are very much like the larvæ of *Hydrocampa stagnata*. Larvæ and pupæ were found in the beginning of May, and also in autumn. Imagos, likewise, in August. The larvæ were found, but more sparingly, feeding also on other water-plants, — *Myriophyllum*, *Trapa natans*, and species of *Potamogeton*. The whitish cocoons containing the pupæ were visible a yard below the surface of the water, fastened to the axils of the leaves. From as many as 100 larvæ and pupæ collected, and which produced imagos in fair numbers, only a very few females were bred. The female imagos sat under water on a leaf, and there kept waving to and fro their stumps of wings. In order to set them, it was necessary to remove them straight from the water to the setting-board, otherwise the wings became, as it were, glued to the body." Herr Disqué records a fact, connected with the powers of flight of this species, which astonished him:—"He was sitting one night on an elevated piece of ground, at least three-quarters of a mile from the haunts of *A. niveus*, when a specimen fell at his feet, attracted apparently by the glare of an electric-light close by. As a rule, the males never rise far above the surface of the water they frequent."

At p. 81, the same writer describes the larvæ of some Tortrices and Tineina, which were previously, as far as I am aware, unknown:—

Teras fimbriana, Thnbg.—"Larva full-fed, viii. e.; to be found between united leaves of sloe; greenish yellow; head pale brown; thoracic and anal segments like the body. Imago emerged, ix. e.—xi. m."

T. lubricana, Mn.—"Larva dirty grey; head black; thoracic segment brown, black on the sides; less frequently entirely

black; fore legs black; anal legs of the ground colour: v. e. in a web, just like that of *Tortrix rosana*, which occurred at the same time on the same sloe bushes. Imago, vi. e."

Tortrix murinana, Hüb.—"Larva green; head and thoracic segment black; anal plate like the ground colour; six black warts on each segment. Bred from the neighbourhood of Baden, where the larvæ had destroyed whole fir plantations."

The last three species have not yet been recorded from Great Britain; but there seems no reason why, as their food-plants are so common, they may not occur with us. It appears that in Germany they are all very local.

Grapholitha microgrammana.—"Larva, viii. e. ix. b., in the still green seed-pods of *Ononis spinosa*: yellowish white; head pale brown; thoracic segment paler, with black dots; the six usual warts on each segment slightly darker, hardly visible; anal plate of the ground colour. Imago, vi. e. vii. b." The imago has been bred in England from small oval sand-cocoons found under *Ononis*, and caught flying always over that plant. The larvæ were suspected to feed in the seed-pods; but, as far as I know, had not been actually detected therein.

Symmoca signatella.—"The imagos were found tolerably commonly, vi. e. vii. b., resting on the trunks of an old lime tree, and singly on oak and plum stems. The larva, which is slender and full-fed, vi. b., lives in the chinks of the bark under a slight web, feeding probably on lichens. It is very difficult to get it out of its hiding-place. In appearance it bears much resemblance to the larva of *H. bracteella*, being grey, with scarcely visible paler warts; head and thoracic segment black-brown; on the 1st segment (? 3rd) are four chitinous brown dots, the two lower being the larger; anal plate grey-brown. Pupa among the bark in a slight web." This account is peculiarly interesting just now, as the species has lately been taken in the London neighbourhood by Mr. A. F. Griffith, of Brighton.

The only paper in the first two numbers of the 'Tijdschrift voor Entomologie' for the present year, that will have any interest for British lepidopterists, is a critical monograph, by Herr P. C. T. Snellen, on the genus *Hypenodes*, Guen. He distinguishes this genus from *Hypena* by the differently shaped terminal joint of the palpi. In *Hypenodes* this is conical and upright; in *Hypena*, flattened and blunter. Eight species are enumerated as belonging to the genus, viz.:—*H. costæstrigalis*, Steph.; *H. tænalis*, Hüb.; *H. kalchbergi*, Staud., S. E. Z., 1876, p. 139, from Sicily, Macedonia, and Derbent; *H. balneorum*, Alpheraki, Hor. Ross., 1879, p. 137, from the Caucasus; *H. jucundalis*, Snell., Tijd. v. Ent. xxiii. p. 121, xxiv. pl. 5, fig. 10, from Celebes; *H. pudicalis*, Snell., Tijd. v. Ent. xxxiii. p. 178, pl. 7, fig. 9; *H. minimalis*, Snell., loc. cit., fig. 10, both from Celebes and Java; *H. obliquialis*, Snell., loc. cit., p. 179,

fig. 11, from Java. The synonymy of our two British species, as carefully worked out by Herr Snellen, I give in full:—

Hypenodes costæstrigalis.

Cledeobia costæstrigalis, Steph., Ill. iv. p. 20, 1834; Wood, Ind. Cat. fig. 772, 1849; de Graaf., Bouwst. iii. p. 57, 1862.

Hypenodes costæstrigalis, Guen., Delt. & Pyr. p. 42, 1854; Staint. Man. ii. p. 129, 1859; Snell., Vlind. p. 494, 1867.

Hypena tænalis, H.-S., Panzer, Deutch. Ins. 166, 1, 1839.

Cledeobia acuminalis, H.-S. ii. p. 442, fig. 619 (pars.), 1845.

Hypenodes tænalis.

Pyralis tænalis, Hüb., Pyr. fig. 151, 1796.

Crambus albistrigatis, Haw., Lep. Brit. p. 368, 1810.

Cledeobia albistrigatus, Steph., Ill. iv. p. 20, 1834; Wood, Ind. Cat. fig. 771, 1839.

Hypenodes albistrigalis, Guen., Delt. & Pyr. p. 42, 1854; Staint. Man. ii. p. 128, 1859; Hein., Schm. D. i. p. 620, 1859; Snell., Tijd. v. Ent. xxx. p. 219, 1887.

Hypena acuminalis, H.-S., Panzer, Deutsch. Ins. 163, 2, 1839.

Cledeobia acuminalis, H.-S. ii. p. 442, fig. 619 (pars.), 1845; Wocke, Bresl. Zeits. Ent. pl. 5, fig. 16, 1850.

(To be continued).

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

BY F. H. PERRY COSTE, F.C.S.

Continued from p. 15.

V.—THE CHEMICAL ASPECT. F. (continued).

Passing now to the simply yellow species, we have some very interesting considerations forced upon us. First of all, as to the genus *Euchloë*: in *E. cardamines* we see an exceedingly soluble orange pigment. Now there is an extra-British species, *E. eupheno*, in which the ground colour is yellow, whilst the tips are red: this is a species on which I have not experimented, and its behaviour can therefore only be surmised. The red would, of course, be instantly changed to the ground yellow, but the real interest centres in the question, what next? The analogy of nearly every red species points to the answer that the yellow (both that already existing and that produced by the transformation of red) would remain unaffected: but, on the other hand, the exceptional behaviour of *Delias* reminds us that it is not impossible that the total yellow might dissolve away entirely; whilst the relationship of *eupheno* to *cardamines*, with its highly soluble pigment, lends some support to this possibility. We can, then,—failing actual experience,—only reserve our decision.

Next, as to *Gonopteryx*: *G. rhamni* is in the halfway condition (column 2 on p. 9) between the species with soluble yellow pigment and those with stable. And, correlated with this, we have the very interesting fact that in the sister species, *G. cleopatra*, there is already a red flush at the base of the primaries. No doubt this red would at once be turned to yellow, and we may fairly legitimately conclude that the total yellow would be even less affected than in *G. rhamni*.*

Next, in *Colias*,† we have converse instances: the yellow is exceedingly soluble, and there are (at least so far as I am aware) no red species in this genus. But—to repeat my warning—we must not fall into the error of applying this fallible criterion too indiscriminately. *Colias* affords an illustration and a warning: for although there may be no red species in the genus, one or two extraordinary red or reddish varieties are reported of *C. edusa*:‡ and a further illustration of the progress which the *Colias* pigment is making towards red may be found not only in the one or two reddish spots and borders which occur on the wings, but also in the remarkable artificially-produced red obtained by Mr. Edwards.

With regard to the remaining yellow species, *L. alexis* calls for no particular comment: and the Arctiidae have been already disposed of. As to the half-dozen Geometrine species, I will merely point out that whilst in none of them is the yellow rapidly dissolved in the satisfactory fashion that prevails with *edusa*, *cardamines*, and *Delias*, yet, in not a single case is it entirely obdurate: in no instance at present to hand has the Geometrine yellow reached the stable stage: and correlated with this we have the fact that red is almost unknown in Geometræ. I am very anxious not to insist on this coincidence, or over-rate its importance, since, in the present state of our knowledge, and without examining a far larger number of species, it is impossible to decide whether this be anything deeper than a coincidence: but at least it is *prima facie* very significant.

* Only since this was in type have I seen actual specimens of *E. eupheno* and *G. cleopatra*: the colour which had been described to me as “red” is, I find, simply deep orange, and in the former species apparently identical with the orange of *cardamines*, with which, no doubt, it would agree in its reactions. As to *cleopatra*, Mr. Warburg informs me that he has experimented thereon, and found the orange to “disappear marvellously, the bright and intense orange being transformed to a paler shade than the natural colour of the female.” Nothing is said, however, as to the effects on the ground yellow; but, since Mr. Warburg has sent me specimens of *cleopatra*, I shall be able to clear up this matter immediately.

† In this section I had intended to redeem my promise of giving the details of the experiments made in reddening the yellow of *Colias*. (See Entom. xxiii. 235). Since my note on this subject, last July, I have continued the experiments, and have obtained most unexpected and interesting results. A full account of these was written out, as appendix to this subsection; but, owing to the length to which this ran, it has been found necessary to hold it over for the present.

‡ For instance, Mr. Anderson describes a specimen displaying a “glowing rosy violet” tint. Entom. xxii. p. 72.

I might, perhaps, add that many of these Geometrine yellows are on the very border-land of yellow, and might with almost equal justice be described as chestnut, with which, too, their reaction betokens a strong similarity. They afford an additional example to those presently to be adduced, of the close relations in constitution between chestnut and yellow.

There remain, then, only the remarkably impervious *T. pronuba* and its miniature analogue, *Heliaca tenebrata*. I suppose that, *à priori*, every one would have anticipated, as I did, that the magnificent orange of this species,—*T. pronuba*,—would be rapidly affected by reagents; but, as a matter of fact, I cannot touch it. After all the preceding remarks in this section on the character of yellows, it may probably be considered very safe to refer this species to the subclass of those possessing a stable yellow pigment; but, as a matter of fact, I think we shall exercise a wise caution in withholding any such judgment until further evidence be forthcoming. The case is peculiar, since, unlike the apparently similar instance of *villica*, &c., we have here no collateral evidence. I can see no reason why there may not be a “physical absorption” yellow as well as pigment yellows; and, granting this, we have absolutely no proof that *pronuba*-yellow is not such. The doubt might be cleared in two ways: in the first place, the existence of a red species (or even a red variety) in the genus would settle the matter at once—as in the Arctiidae—in favour of pigments; or, secondly, if other yellow species of *Triphæna* were found to be affected, as is *Catocala cerogama*, that also would be tolerably conclusive. At present I have examined no other species of *Triphæna*, but my impression is rather that the wings of the less brilliant species are more suggestive—in superficial appearance—of physical colours than of pigments. Anyhow, for the present we must leave this question an open one.

And finally, now to complete the consideration of red and yellow, we have yet to take into account the intensely interesting subject of *reversible effects*, which, so far as I at present know, are displayed by this colour—red—alone. Perhaps the simplest manner of explaining this will be to proceed historically,—following the order of my discoveries. We will start from the fact that all reds are turned yellow,—by acids especially. Wishing to preserve a few permanent preparations of these artificial varieties, I soaked the wings of one or two perfect insects, *Euchelia jacobææ* and *Zygæna filipendulæ*, with hydrochloric acid, washed them with water to remove the acid, then with alcohol (perhaps—but I am not sure now) to assist the drying, and when dry put them away in a store-box. On opening this some time afterwards I found, to my utter disgust, that my beautiful yellow varieties had *reverted to their original red*. Of course, it is scarcely necessary to say, that I saw at once the great importance of this unlooked for phenomenon, and the consequent necessity for a thorough and

exhaustive examination of the relations between red and yellow: a development as unexpected as discouraging, coming as it did at a time when I fancied myself to be pretty well acquainted with the phenomena of the red pigment. At this time my articles were already in course of publication in the 'Entomologist'; and not knowing what modifications in views already foreshadowed might be necessitated by this new departure, I inserted,—in order to guard myself somewhat,—the footnote on p. 186 as to the "after phenomenon," confining it, however, to the case of hydrochloric acid; at the last moment, before this was published, I obtained further results, which led me to add, "and other acids." We will now consider the question in detail.

Three, and only three, explanations seemed possible, of this reversion to the original red: it might be a *time* effect pure and simple: it might be due to washing with water; or to washing with alcohol.

I first made a set of experiments with *Z. filipendulæ*—

A. & B. Wings were exposed to HCl for one hour.

C. Similar exposure for two hours.

D. Similar exposure for *one* week.

In each case a parallel experiment was made with HNO_3 in order to determine whether the reversion phenomenon was or was not confined to specimens originally transformed by HCl.*

The wings, at the expiration of their periods of exposure, were respectively treated as follows:—

A. By merely washing with distilled water a large part of the red returned there and then *in the HCl specimen*. The HNO_3 specimen remained *immovably yellow*.

B. Washed as above, then with alcohol, and finally left standing in alcohol.

C. Simply washed as with A., and with the same result. The HCl specimen recovered its red; the HNO_3 remained yellow. But on examining these A., B. and C. (HCl) specimens after a lapse of 24 hours, I found that they were again yellow; and at the end of a week still yellow (C. orange). But on washing again with water the red was *partly restored*.

All the HNO_3 specimens had retained their yellow from first to last.

D. The HCl specimen (after one week's exposure to acid), was *at once restored to red* by simple washing.

The HNO_3 specimen remained immovably yellow.

A., B. (or C.) and D. HCl specimens, after having regained their red, as above related, were left alone for a week. At the end of that time they were still the full red.

The HNO_3 specimens of course had retained their yellow.

* This whole set of experiments was made in the same mode as usual, *viz.*, by treating wings gummed on to watch-glasses.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

NOTES ON THE SEASON, 1890.—The experience of many entomologists seems to be that Lepidoptera have been scarce during the past season, but, as far as I am concerned, the year 1890 has been quite up to the average; at least as regards numbers. I append a list of some of my captures in Enfield. From pupæ obtained at the roots of oak trees during the winter, I bred *Taniocampa gothica*, *T. incerta (instabilis)*, and *T. stabilis* freely; also *Phigalia pedaria*, two females of which emerged in January. In March I captured *Amphidasys strataria*, and males of *Hybernica marginaria* were to be had in plenty at the street-lamps. Two specimens of *Smerinthus populi* emerged in May; and on the 10th of that month I caught a stray *T. gothica* at a street-lamp, although the last of those I had bred emerged on the 5th of April. During May insects were very abundant, notably *Euchloë cardamines*, *Nisonades tages*, and *Euclidia glyphica*: of these three species I could have taken hundreds. *Syrichthus malvæ*, *Heliodes tenebrata (arbuti)*, and *Euclidia mi* were fairly common. Two specimens of *Dicranura vinula* and one of *Acronycta megacephala* emerged early in June from pupæ obtained the previous year; I also bred *Metrocampa margaritaria* from larvæ beaten off hornbeam in May. *Noctua augur*, common; *Hepialus humuli*, twice taken; *Plusia iota*, once. Larvæ, as a rule, were scarce; but *Miselia oxyacanthæ* larvæ were not uncommon, and those of *Diloba cæruleocephala* and *Bombyx neustria* were extremely abundant; on the 7th of June I took two nests (numbering about 150 individuals) of the latter off one sloe-bush. Most of the common species of Rhopalocera were fairly abundant, with one striking exception: *Hesperia sylvanus* appeared in its usual numbers; but of *H. thaumas (linea)*, usually so common during the latter part of June, I did not see a single specimen during the whole of the year. In July my chief captures were *Phorodesma pustulata* and *Hemithea strigata*; also *Plusia chrysitis* and *Pericallia syringaria* at syringa-bloom, which is considerably more efficacious than sugar while it lasts. Perhaps the most abundant moths were the day-flying *Eubolia limitata (mensuraria)* and *Cidaria associata (dotata)*; this latter flying over our currant-bushes during the evening. In August I sugared vigorously and frequently; but the only species rewarding my exertions were:—*Amphipyra pyramidea* (fairly common, though not nearly so much so as in former years), *Mania typica*, *M. maura*, *Calymnia affinis* and *C. diffinis*, *Boarmia gemmaria*, *Noctua xanthographa*, *Triphæna comes* and *T. pronuba*, and, “last, but not least,” *Xylophasia monoglypha (polyodon)*. On the 15th of the month I found a batch of ova of *Arctia caia* on willow; this is the second time I have found them on this plant; I usually find the larvæ on stinging-nettle, and feed up nearly all my larvæ on it. I have never seen either of these food-plants mentioned before, although I have never found the larvæ on any other plant, except the common dead-nettle (*Lamium album*). The first fortnight of September I spent at Lowestoft, where I took the following species at gas-lamps:—*Bryophila perla*, *Luperina testacea*, *Melanippe fluctuata*, and *Pionea forficalis* (common); also single specimens of *Porthesia (Liparis) similis (auriflua)*, *Mania maura*, and *Eugonia (Ennomos) fuscantaria*. On the 12th of this month I caught a specimen of *Eubolia limitata*; in Enfield I never see it later than the first week of August, and it is most abundant at the beginning of July. I returned home on the 14th, and found a larva

of *Smerinthus ocellatus* awaiting me. A day or two after I took a *Polia flavicincta* at sugar. In October my only captures were *Anchocelis pistacina* and *Miselia oxyacanthæ*. In November I took *Phlogophora meticulosa* at ivy-bloom; and *Himera pennaria* and *Cheimatobia brumata* at gas-lamps.—H. D. SYKES; The Cedars, Enfield, Middlesex, Dec. 10, 1890.

NOTES FROM THE NEW FOREST.—On May 31st, 1890, my brother and I took up our quarters at Brockenhurst for a week's collecting. Unfortunately, the weather was not all that could be desired, the greater part of the week being rainy and dull, so that butterflies were not abundant. *Argynnis euphrosyne* showed itself freely whenever there was a gleam of sunshine; and towards the end of the week *A. selene* began to appear. *Nemeobius lucina* was locally plentiful, and one morning we took eight specimens. Only two examples of *Thecla rubi* put in an appearance, but that was probably owing to the dull weather. *Gonopteryx rhamni*, in a battered condition, was fairly common. *Euchloë cardamines* not so plentiful as usual, but the males and females in about equal proportions. Beating produced a few moths:—*Drepana hamula*, *D. falcula*, *D. lacertula*, *Zonosoma punctaria*, and *Epione advenaria*, from oak and birch; while *Bupalus piniaria* and *Thera obeliscata* swarmed about the pines. From the heaths, *Bombyx rubi* and *Phytometra ænea* in hundreds, amongst which were some exquisite specimens, and *Scodiona belgiana*. A bright, sunny day produced *Macroglossa fuciformis* in tolerable abundance; *M. stellatarum* and *M. bombylifformis* (one specimen only). Other captures were, *Dasychira pudibunda*, *Tanagra chærophyllata*, *Bapta taminata*, *Anaitis plagiata*, &c. By beating, the following larvæ were obtained:—*Thecla quercus*, *T. betulæ*, *Pæcilocampa populi*, *Trichiura cratægi*, *Eriogaster lanestris*, *Miselia oxyacanthæ*, *Asteroscopus cassinea*, *Hypsipetes elutata*, in countless numbers, &c. Accompanied by a cousin, Mr. R. E. James, a second visit was made in the middle of July, from the 12th to the 19th of the month; *Argynnis paphia* and *Limenitis sybilla* were out in large numbers and in beautiful condition, and among the latter my cousin was fortunate enough to capture a fine specimen of the black variety. The females of *A. paphia* were not well out, and we only took three specimens of the variety *valesina*. *A. adippe* and *A. aglaia* were fairly plentiful; *A. selene* and *Lycena ægon* were common on the heaths; and among the swarms of *Epinephele ianira* we took several "bleached" varieties. A few *Nemeophila russula* from heath. The only Noctuxæ taken were *Plusia iota*, *Aplecta nebulosa*, *Agrotis porphyrea*, *Leucania lithargyria*; treacling being a total failure. Among the Geometræ were captured, *Ellopiæ fasciaria*, *Boarmia roboraria*, *Pseudoterpna cytisaria*, *Phorodesma bajularia*, and *Boarmia repandata* var. *conversaria*. The following larvæ were also obtained:—*Hadenæ proteus*, *Cidaria miata*, *Saturnia carpini*, and *Macroglossa fuciformis*; five specimens only of the latter, and all unfortunately proved to be ichneumonated. Among Coleoptera, *Cicindela campestris* and *Lucanus cervus* were very abundant; and a specimen of *Calosoma sycophanta* was captured.—WILLIAM J. OGDEN; 93, Clapton Common, N.E.

THE CHESHIRE PLAGUE OF CATERPILLARS.—If Mr. Newstead will do me the favour to again read my remarks (Entom. xxiii. 293), he will find that my expression, "extraordinary appearance of caterpillars," is synonymous with what it clearly refers to, viz., "plague of caterpillars." He writes (Entom. 19), "I do not wish to convey to the reader the idea that we

had a plague of caterpillars, in the true sense of the word." Clearly, then, for anyone to say we had such a plague would be to say what was untrue, which is exactly my case,—“Quod erat demonstrandum!” Some readers will have probably noticed two points in this controversy. First, the editor's note on “A Plague of Caterpillars,” with invitation to correspondents, appeared in the August number of the ‘Entomologist.’ Although devoted to the study of Economic Entomology, more than three months elapse before Mr. Newstead says anything on the subject; and then, when he does write, on November 20th, it is to nullify evidence carefully collected, and perfectly consistent with the character of the past season. Secondly, he gives no localities. It is, therefore, impossible to test the scope or accuracy of a single case that he quotes.—J. ARKLE; 2, George Street, Chester. [We feel sure that each correspondent, who has kindly communicated with us upon this subject, has simply stated such facts as were either within his own knowledge or obtained from trustworthy sources.—ED.]

THE ILLUMINATED MOTH-TRAP.—The following is a completed list of Lepidoptera taken in illuminated moth-traps at Watergate, in the years 1887 to 1890, inclusive. Only in the present year have the traps been used after the end of July:—*Sphinx ligustri*, *Nola confusalis* (*crisulalis*), *N. mundana*, *Lithosia mesomella*, *Euchelia jacobææ*, *Arctia caia*, *Spilosoma lubricipeda*, *S. menthastri*, *Hepialus lupulinus*, *H. velleda* and var. *carnus*, *H. hectus*, *Psilura monacha*, *Dasychira pudibunda*, *Pæcilocampa populi*, *Drepana falcatoria* (*fulcula*), *Cilix glaucata* (*spinula*), *Lophopteryx camelina*, *Notodonta trepida*, *Phalera bucephala*, *Cymatophora duplaris*, *Demas coryli*, *Acronycta ligustri*, *Leucania conigera*, *L. lithargyria*, *L. impura*, *L. pallens*, *Hydræcia nictitans*, *Xylophasia monoglypha* (*polyodon*), *Neuronia popularis*, *Cerigo matura* (*cytherea*), *Luperina testacea*, *Mamestra persicariæ*, *M. didyma* (*oculea*), *Caradrina taraxaci* (*blanda*), *Rusina tenebrosa*, *Agrotis segetum*, *A. corticea*, *A. cinerea*, *Noctua triangulum*, *N. stigmatica* (*rhomboidea*), *N. festiva*, *Amphipyra tragopogonis*, *Tæniocampa gothica*, *Cosmia trapezina*, *Dianthæcia nana* (*conspersa*), *D. cucubali*, *D. carpophaga*, *Cleoceris viminalis*, *Aplecta advena*, *Hadena adusta*, *H. dentina*, *Asteroscopus sphinx* (*cassinea*), *Plusia chrysitis*, *P. v-aureum*, *P. gamma*, *P. moneta*, *Toxocampa pastinum*. Geometræ:—*Epione advena*, *Rumia luteolata* (*cratægata*), *Metrocampa margaritaria*, *Eurymene dolobraria*, *Pericallia syringaria*, *Selenia bilunaria* (*illunaria*), *S. tetralunaria* (*illustraria*), *Odonoptera bidentata*, *Crocallis elinguaris*, *Eugonia quercinaria* (*angularis*), *Himera pennaria*, *Hemerophila abruptaria*, *Cleora lichenaria*, *Boarmia repandata*, *B. abietaria*, *B. roboraria*, *Tephrosia crepuscularia* or *biundularia* (perhaps both), *T. luridata* (*extersaria*), *T. punctularia*, *Geometra papilionaria*, *G. vernaria*, *Iodis lactearia*, *Zonosoma porata*, *Z. linearia* (*trilinearia*), *Z. annulata* (*omicronaria*), *Asthena sylvata*, *Acidalia dimidiata* (*scutulata*), *A. bisetata*, *A. marginepunctata* (*promutata*), *A. remutaria*, *A. imitaria*, *A. aversata*, *Timandra amataria*, *Cabera pusaria*, *C. exanthemaria*, *Aleucis pictaria*, *Strenia clathrata*, *Panagra petrararia*, *Numeria pulveraria*, *Abraxas grossulariata*, *Ligdia adustata*, *Lomaspilis marginata*, *Hybernica aurantiaria*, *H. defoliaria*, *Cheimatobia brumata*, *Larentia didymata*, *L. viridaria* (*pectinitaria*), *Eupithecia oblongata* (*centaureata*), *E. plumbeolata*, *E. nanata*, *E. vulgata*, *Hypsipetes sordidata* (*elutata*), *Melanthia ocellata*, *M. albicillata*, *Melanippe unangulata*, *M. rivata*?, *M. sociata* (*subtristata*), *M. montanata*, *M. fluctuata*, *Anticlea badiata*,

A. nigrofasciaria (derivata), *A. ferrugata*, *Phibalapteryx tersata*, *P. vitalbata*, *Cidaria corylata*, *C. truncata* (russata), *C. immanata*?, *C. fulvata*, *C. dotata* (pyraliata), *C. associata* (dotata), *Eubolia limitata* (mensuraria), *E. plumbaria* (palumbaria), *E. bipunctaria*.—About 130 species. The season of 1890 has not been a good one for light. There have been very few favourable nights, and it has only been by the use of two traps, and their being almost constantly at work, that I have obtained so many species by means of the attraction of light. As it may be of interest, I append particulars, meteorological and otherwise, of three of the best nights this year. May 20th.—Warm, several violent squalls, with drenching rain, during the night:—*E. dolabraria*, 1; *M. montanata*, 1; *A. remutata*, 2; *T. crepuscularia*, 4; *E. lariciata*; *N. trepida*, 2; *L. camelina*, 1; *D. pudibunda*, 6; *D. coryli*, 1; *E. vulgata*, 1. June 7th.—Minimum during night 40°, windy; the trap was placed in a narrow wood-ride, to be protected from the wind:—*H. velleda*, 1; *L. camelina*, 1; *S. lubricipeda*, several; *S. menthastri*, several; *R. tenebrosa*, 1; *H. adusta*, 1; *C. bidentata*, 2; *N. pulveraria*, 1; *L. viridaria* (pectinitaria), 3 or 4; *E. lariciata*, 1; *E. vulgata*; *E. plumbeolata*; *M. montanata*, abundantly; *M. fluctuata*, 2; *C. truncata* (russata), 1. July 2nd.—Warm; at 11.30 p.m. the thermometer stood at 57°; W.N.W. wind; moon full, but well obscured by clouds:—*S. lubricipeda* and *S. menthastri*, as usual; *R. tenebrosa*, 1; *N. festiva*, 1; *P. moneta*, 1; *M. margaritaria*, 5; *G. papilionaria*, 1; *C. exanthemaria*, 1; *P. tersata*, 2; *T. amataria*, 1; *A. imitaria*, 1.—W. M. CHRISTY; Watergate, Emsworth.

FRAUDULENT COLOUR-VARIETIES.—I think that it is incumbent on me to utter a note of warning on this subject to collectors. We all know that occasionally "varieties" are manufactured and passed off upon the unwary as being genuine examples; and some time since an imposture of this sort was detected, and described in the 'Entomologist.' In that case, however, as also, I believe, in many others, the fraud was perpetrated by means of painting, and was, therefore, pretty easy of detection. Now, however, anyone who cares to take a hint from my experiments may manufacture the most excellent varieties, and without fear of detection. I would undertake to produce, myself, yellow varieties of normally red species, milk-white specimens of *P. phlaas*, "sea-bleached" varieties of the heath butterflies, and so on, that would, I think, defy detection as artificial, and would very safely be passed off as genuine varieties. Since, then, I feel that I have thus opened a door to the unscrupulous, it is only right that I should fairly warn the readers of the 'Entomologist' against the chances of such deception. I would strongly recommend collectors, therefore, to buy no varieties similar to those artificial ones that I have described in the tables on pages 248–251, &c., of the last volume, and neither even to accept them in exchange, unless from correspondents whose good faith is already known to them. If, after this warning, any enthusiastic variety-hunter is cheated by imitators of my experiments, I shall feel that I have washed my hands of responsibility.—F. H. PERRY COSTE; Ravenshoe, Burnt Ash, Hill, S.E., January 9, 1891.

THE DISTINGUISHING MARKS BETWEEN *TENIOCAMPA OPIMA*, *T. POPULETI*, AND VARIETIES OF *T. INCERTA*.—Will any readers of the 'Entomologist' kindly inform me of the definite difference in the markings of the above insects? I have read Newman and Stainton closely on all three insects;

but I have caught insects which, I have been told by good entomologists, are varieties of *T. incerta (instabilis)*, but which I have thought have been either *T. opima* or *T. populeti*. As the fallow season is coming on, if this weather ever changes, I should be obliged for any information on the subject through the 'Entomologist.'—THROWLEY; Lees Court, Faversham.

GYNANDROMORPHIC SPECIMEN OF *TRICHIURA CRATEGI*.—This specimen (bred in August last) only differs from the one previously recorded (Entom. xxiii. 345) in having both pairs of wings perfectly developed. The line of division down the thorax and abdomen, between the pale grey of the male on the right hand, and the brownish grey of the female on the left, is very sharply defined.—R. M. PRIDEAUX; 9, Vyvyan Terrace, Clifton, Bristol.

ABERRATION OF *DIANTHÆCIA NANA*.—In August, 1889, I took, at Mullion in Cornwall, many *Dianthæcia* larvæ in the capsules of *Silene inflata*, and its var. *maritima*. In June and July, 1890, five perfect *D. nana* came out, in four of which the cream-white markings are entirely replaced by the buff; both the buff and smoky markings have an olive-green tinge, which was very noticeable on emergence. In the fifth, the change of colour is only partial. In all, the markings are otherwise typical.—W. S. RIDING; Buckerell Lodge, Honiton.

CARABUS NITENS AT WIMBORNE AND RINGWOOD.—I have taken two of these beetles, both in the spring; one at Wimborne, near a pond; the other upon my lawn, whilst cutting the grass.—J. H. FOWLER; Ringwood.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*January 21st, 1891.*—The Fifty-eighth Annual Meeting; the Right Hon. Lord Walsingham, M.A., F.R.S., President, in the chair. An abstract of the Treasurer's accounts was read by Mr. Herbert Druce, one of the Auditors, and the Report of the Council was read by Mr. H. Goss. It appeared therefrom that the Society had lost during the year five Fellows by death and had elected twenty-seven new Fellows; that the volume of Transactions for the year extended to nearly 700 pages, and comprised twenty memoirs, contributed by seventeen authors and illustrated by twenty-one plates. It was then announced that the following gentlemen had been elected as Officers and Council for 1891:—President, Mr. Frederick DuCane Godman, M.A., F.R.S.; Treasurer, Mr. Robert M'Lachlan, F.R.S.; Secretaries, Mr. Herbert Goss, F.L.S., and the Rev. Canon Fowler, M.A., F.L.S.; Librarian, Mr. Ferdinand Grut, F.L.S.; and as others, Members of the Council, Prof. R. Meldola, F.R.S., Mr. Edward Saunders, F.L.S., Dr. David Sharp, F.R.S., Mr. Richard South, Mr. H. T. Stainton, F.R.S., Colonel Charles Swinhoe, F.L.S., Mr. George H. Verrall, and the Right Honble. Lord Walsingham, M.A., F.R.S. It was also announced that the new President had appointed Lord Walsingham, Prof. Meldola, and Dr. Sharp, Vice-Presidents for the session 1891—1892. Lord Walsingham, the retiring President, then delivered an Address. After alluding to some of the more important Entomological publications of the past year,

and making special mention of those of Edwards and Scudder in America, of Romanoff in Russia, of the Oberthürs in France, and of Godman and Salvin in England, the President referred to Mr. Moore's courageous undertaking in commencing his 'Lepidoptera Indica,' on the lines adopted in his 'Lepidoptera of Ceylon.' Attention was then called to the unusual development during the past year of the study of those problems which have been the object of the researches of Darwin, Wallace, Weissmann, Meldola, Poulton, and others, and to the special and increasing literature of the subject. In this connection allusion was made to Mr. Tutt's 'Entomologist's Record and Journal of Variation,' to Mr. Poulton's valuable book 'On the meaning and use of the Colours of Animals,' and to the interesting and important papers and experiments of Mr. F. Merrifield on the subject of the variation in Lepidoptera caused by differences of temperature. After alluding to the International Zoological Congress held at Paris during the past year, and to the rules of nomenclature which had been once more reviewed and revised, the President concluded by referring to the losses by death during the year of several Fellows of the Society and other Entomologists, special mention being made of Mr. E. T. Atkinson, Mr. J. S. Baly, Mons. l'Abbé de Marseul, Mr. Owen Wilson, Mons. Lucien Buquet, Mons. Eugene Desmarest, Prof. Heinrich Frey, Dr. R. C. R. Jordan, Mr. W. S. Dallas, Dr. L. W. Schaufuss, Dr. Hermann Dewitz, Mons. Louis Reiche, and Herr Peter Maassen. A vote of thanks to the President for his services during the year and for his address was proposed by Dr. D. Sharp, F.R.S., seconded by Mr. M'Lachlan, F.R.S., and carried. Mr. M'Lachlan then proposed a vote of thanks to the other Officers of the Society, which was seconded by Mr. S. Stevens, and carried. Lord Walsingham, Mr. Goss, and Mr. Grut replied.—H. Goss, *Hon. Secretary*.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.
—Jan. 8th, 1891. — W. H. Tugwell, Vice-President, in the chair. Messrs. H. Williams, of Hornsey; and T. J. Washford, of Dulwich, were elected members. Mr. R. Adkin exhibited *Boarmia repandata*, L., bred from ova obtained from a moth taken at Westerham. During hybernation the larvæ were divided into two equal lots, one kept on growing privet, the other on growing birch. Although each lot produced some few individuals varying from the majority, there was no marked difference between the bulk of the one lot and the other. Mr. Adkin also exhibited *Retinia buoliana*, Schiff., and *R. pinicolana*, Dbl., bred from larvæ collected in the neighbourhood of Poole, the New Forest, and Surrey. Those from Poole and the New Forest emerged between June 26th and July 27th, and were all *buoliana*; those from Surrey emerged between July 12th and August 3rd; from July 12th to 22nd, all *buoliana*; from July 25th to August 3rd, all *pinicolana*, with the exception of one *buoliana* bred on July 27th. Mr. Tugwell exhibited two series of *Miana strigilis*, St., and *M. fasciuncula*, Haw., and referred to the statement recently made by Mr. Tutt, that these two species were only forms of one, he having received specimens which were intermediate between the two from the Rev. W. F. Johnson, of Armagh. Mr. Tugwell said this statement had considerably surprised him, and he at some length pointed out what he considered were the differences between the two. He also referred to the published descriptions of the larvæ respectively made by Newman and Buckley. Mr. Fenn remarked that he did not think Newman's descriptions of the larvæ were very

reliable, as that gentleman never adopted any system in describing them. He thought, also, that larvæ varied so much in their different states, that the descriptions of solitary larvæ were of very little value. Mr. South expressed an opinion that the two species were undoubtedly distinct, in which opinion Mr. Barrett concurred, pointing out what he considered good distinctions between the two, adding that the larvæ, which were internal feeders, were very difficult to obtain and rear, and would no doubt vary considerably, although he had never himself bred any of the *Mianæ*. Mr. Tutt said that he considered the points of difference alluded to were only superficial and unsatisfactory; the remarks made by him as to the two species being identical were based, not on an isolated specimen of the form received from Ireland, but on a long series of the form which was certainly intermediate between *strigilis* and *fasciuncula*; he would, however, at a future meeting, exhibit the specimens referred to. Mr. Tutt, on behalf of Mr. Reid, of Pitcairle, exhibited long series of *Agrotis simulans*; a fine series of *Triphana comes*, Hb., varying from pale to very dark, some of the specimens being beautifully banded; very bright forms of *Melitæa aurinia*, Rott.; also dark examples of *Melanippe fluctuata*, L.; and some specimens of *Abraxas grossulariata*, L.; this species Mr. Tutt stated had been introduced by Mr. Reid in the vicinity of Pitcairle with some success, and had apparently developed sexual dimorphism, the males becoming darker and females paler every year. Mr. Manger showed a box of Coleoptera from Australia.—H. W. BARKER, *Hon. Sec.*

LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY. — *January.* — The Annual Meeting of this Society was held in the class-room of the Free Library, William Brown Street, when the President, Mr. S. J. Capper, occupied the chair, and delivered an address. He remarked that, having been frequently asked the question why have a special society devoted solely to the study of insects, *viz.*, an "entomological society," in towns where there were biological societies and natural history societies, which, of course, included this study, it had occurred to him that an apology for the Society, even though it had now been in existence fourteen years, might not be altogether inopportune. Before replying, he expressed his warmest sympathy with all societies and individuals interested in natural history, and in this feeling he was sure they all reciprocated, whilst many of them were, in addition to their own, members of other similar associations. It was, however, the vast field of investigation embraced by such associations as those alluded to, that led to the formation of societies like their own, where the studies were more circumscribed. However inexplicably, there appeared something peculiar in insect life that attracted certain minds specially. Most of those thus attracted would probably be naturalists generally, but they would acknowledge that they had a special predilection in this direction. This led to the formation of a special society. It was most fortunate for the advancement of knowledge that men's minds were so constituted, and that they were enthusiasts in different directions and became specialists, otherwise the fields of research were so inexhaustible that little real permanent work would be achieved. It would be found, in societies with more pretensions, that the men who made the greatest discoveries and did much practical work were specialists in some department. Briefly, the necessity for a society like their own was that the study of insect-life was attractive very specially to certain persons, drawing them into deep sympathy with each other, and

establishing a kind of bond of union—he might say a kind of freemasonry—between them. Accordingly they made the study of insects the object of their Society. They admitted the comprehensiveness of their pretensions, and when they meet together it was found that most members had a special interest in some particular group, and in this became specialists, as, for instance, they had lepidopterists, coleopterists, &c. Fortunately, from an experience extending over fourteen years, they still claimed very great enjoyment in associating together, and found, in the discussion of matters connected with insect life alone, full employment for the hour or two monthly at their disposal, which in other societies were devoted to more general natural history. With the exception of a few months in the summer seasons, they had met regularly once a month. At most of their meetings original papers or essays on entomology had been read and discussed. A list of these papers, numbering 134, was printed in their last annual report, and over fifty of these were considered of sufficient importance to merit publication in their periodicals and other literature. Any surplus income had been devoted to the purchase of books on entomology, and they were gradually acquiring a valuable library. They had from time to time made known, and would now through the public press repeat, their willingness to give all the information in their power to agriculturists and others who suffered from the attacks of injurious insects, pointing out the best means of avoiding or remedying the same. In several instances they had been able to give most valuable assistance. In the future he proposed that, in addition to a complete insect fauna of their two counties, they undertook the investigation as far as possible of the life-history of each individual, ascertaining whether it was beneficial or injurious, so as to encourage its preservation or extirpation. They should in this set a noble example to other entomological societies, and let them hope that the day was not far distant when they should have such associations in each county. He also proposed that they form typical collections of all orders of insects, which would be valuable as instruction for their younger members. One of their hon. members, Mr. James Fletcher, entomologist and botanist of the experimental farms, Canada, had kindly forwarded for their acceptance reports of their Proceedings, 1887, 1888, and 1889, together with other printed interesting entomological matter. In these reports were published most elaborate observations on injurious insects, similar to those of Miss Ormerod and Mr. Whitehead in their own country, with the best means of remedying injurious attacks. Depend upon it, the work of societies like their own would be more and more the study of economic entomology. It had only been within the last decade or so that the importance of this had been prominent. Now it was recognised all over the world. With the exception, however, of Miss Ormerod's excellent work in their own country, the importance of these investigations were almost confined to America, but were now acknowledged in Belgium, Germany, France, Russia, Australia, and other countries. Let them, then, undertake economic entomology, modestly confining their observations to their own counties; but, having as it were circumscribed their work, let them hope it might be the more efficiently performed, and that their example might be followed by entomologists in other counties or districts, until the whole of the country was systematically embraced. The officers elected for the year were:—Mr. S. J. Capper, President; the Rev. H. H. Higgins, Vice-President; and Mr. F. N. Pierce, Hon. Secretary.

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NOTE ON *AGROTIS SUBGOTHICA*, HAW.

By J. JENNER WEIR, F.L.S., &c.

AN insect is figured under the above name in Stephens's Ill. Br. Ent., Haust. II., 126, pl. xxii. f. 3 (1829), and again by Wood, Ind. Ent. 36, pl. ix. f. 149 (1839). Rennie very imperfectly describes it in his Cons. Butt. and Moths (1832), and says that it is "scarce; Norfolk, near London, and Devon." Doubleday's Syn. List Brit. Lep. (1850), p. 12, gives the name under the head of "Reputed British Noctuæ." Stainton, in his Man. Br. Butt. and Moths (1857), does not mention the name; nor does Newman advert to it in his Ill. Nat. Hist. Brit. Moths (1869), except as a variety of *A. tritici*. Lastly, the name does not appear in South's Syn. List Br. Lep. (1884).

So completely has the name of the insect been lost sight of that, during my intercourse with British entomologists for more than half a century, I cannot recollect that I ever heard it mentioned as having been taken in England.

Haworth's name of the species seems to have migrated to America, but whether the common species, known under that name there, is that figured by Stephens is doubtful. I find that my excellent friend Prof. Riley, in his 'First Annual Report on the Noxious, Beneficial, and other Insects of the State of Missouri' (1869), p. 82, gives a figure of the moth (fig. 29, *a, b*), and appends Haworth's description, and states that Dr. Fitch concludes that it is an American insect, the eggs or larvæ of which have been accidentally carried to England. Since this decision Haworth's name has been generally applied to the American species, which is said to be synonymous with Walker's *Feltia ducens*, Lep. Het. ix. p. 203, n. 1 (1856).

Prof. Riley, in the same Report adverted to above, pp. 82, 83, gives an account of another *Agrotis* as the *A. jaculifera*, of which

he writes that it resembles the preceding species almost in every particular, pointing out certain differences; this latter species is figured in pl. i. fig. 11, he states, and it appears by the plate to be a smaller moth than *A. subgothica*.

Mr. Butler, in 'Transactions of the Entomological Society of London' (1889), p. 377, gives both species in his "Synonymic notes on the moths of the earlier genera of Noctuides" thus:—*Agrotis subgothica*, Haw. (*Feltia ducens*, Walk.), and *Agrotis jaculifera*, Guén.; stating the latter to be the *A. tricola* of Lintner, and the *A. herilis*, Grt. to be a very slight variety of it, but that as its specific identity is unproved he has retained it as a distinct species in the collection. So far all seems very clear, at least to the extent that it is possible to judge from figures and descriptions of so difficult a group as *Agrotis* and its allies.

Through the liberality of the Smithsonian Institution, I have of late become possessed of the 'Bulletin of the United States National Museum,' No. 38 (1890), in which there is a most elaborate and truly valuable paper entitled, "A Contribution toward a Monograph of the Insects of the Lepidopterous family Noctuidæ of Temperate North America: Revision of the Genus *Agrotis*," by John B. Smith. In this work I find the insect, identified by Riley as *A. subgothica*, given as *Feltia jaculifera*, Gn., and the *Agrotis jaculifera* of Riley, in the Report quoted above, is given as *Feltia subgothica*; in other words, the names are reversed, and *Feltia herilis*, Grt., is treated of as a distinct species.

Mr. Tutt, in the 'Entomologist's Record,' p. 10, writes thus:—"As is well known to British lepidopterists, *subgothica*, Haw., is not a distinct species at all, but simply a synonym of *A. tritici*, Linn., or at most a variety of that species."

I am puzzled: to what insect was the name of *Agrotis subgothica* given by Haworth and figured by Stephens?

In the 'Bulletin' mentioned I find the following British species are also North American, viz.:—*Agrotis ypsilon*, Rott. (*suffusa*, S.V.); *Peridroma occulta*, Linn.; *P. saucia*, Hüb.; *Noctua baja*, Fab.; *N. c-nigrum*, Linn.; *N. plecta*, Linn.; and, of course, *N. fennica*, sometimes claimed as a British "casual or accidental visitor."

I have omitted to mention that Staudinger, in his 'Catalog der Lepidopteren des Europæischen Faunengebiets,' does not include the name of *Agrotis subgothica*.

Beckenham, Kent.

LIFE-HISTORY OF *PACHNOBIA LEUCOGRAPHA*.

By J. ARKLE.

I AM indebted to Dr. Chapman, of Hereford, for an acquaintance with the life-history of this rare, local, and interesting moth—so rare that it frequently figures amongst “the few unrepresented species” in the cabinets of the older entomologists. During the last two seasons, early in the month of April, I received eggs from Hereford, which is one of the few localities for the insect. What I considered to be a careful description of the egg got lost; but Dr. Chapman again comes to my aid, and, in kindly helping out these observations with his own remarks upon the egg, converts my loss into a material gain.

“The diameter,” he observes, “is .78 mm.; height .69 mm.; not quite spherical, but rather flattened below and narrowing upwards; about 44 ribs, terminating upwards in a raised waved margin round micropylean area: ribs sharp, fluted by indications of cross ridges, which are obsolete. Colour orange-yellow, with brownish red markings crowded together into an apical blotch, and a marginal zone, with an intermediate subapical zone nearly free (a common pattern in *Noctua* eggs). The top patch of brown is very large, and the zone below more regular than in egg of *P. rubricosa* (which has 40 ribs). Newly laid:—colour pale greenish or greenish-yellow.”

The eggs I kept in a glass tumbler, with the usual gauze covering, elastic band, and square of glass over the top. They hatched about the 7th of May. Upon the larvæ, fed throughout on chickweed, I made the following notes, which correspond to the different moults or changes of skin. The caterpillar is not of active habits. It is apparently averse to much climbing or travelling, and is very easily reared.

1st.—After hatching:—head light brown; 2nd, 3rd, and 4th segments dark green; remaining segments very pale green. In moving, the caterpillars “loop” like Geometers; if disturbed they immediately assume a Sphinx-like attitude, sitting up in the form of the letter S, and looking very much—in colour, shape, &c.—like a bit of chickweed stem. At the slightest touch they fall to the ground.

2nd.—Head pale green, suffused with brown. Body uniformly green, but paler underneath. Characteristics as in 1st stage. The larvæ were now changed into large flower-pots, three parts filled with light soil. A covering of net was substituted for the gauze, and retained, with a glass covering, until the emergence of the perfect insect.

3rd.—Head inclining to russet-colour. Dorsal area olive-green; under surface pale apple-green. Each segment on the

back is divided by a silvery-white thread-like line. There is a thin medio-dorsal silvery-white line, and a similar line (subdorsal) along each side. Below each subdorsal line is a stripe of the same colour. The Geometer method of progression is now changed for that of the Noctua.

4th.—Head light pea-green. Dorsal area pea-green and mottled with white. Each segment is divided by a well-defined yellowish line. Under surface pea-green, but a shade darker than the dorsal area; legs and claspers same shade as the under surface. On the back of each segment are two oblique pea-green marks, which, in the next stage, meet like the arms of the letter V. In this stage, however, they are not joined, but show a disposition to converge on each anal division. There is an interrupted medio-dorsal white stripe. On each side is a well-defined silvery-white line, immediately bordering on which, above, is a line of dark green.

Last stage.—The caterpillar is uniformly apple-green, *viz.*, a shade darker than pea-green; all the segments above and below being beautifully mottled with deep yellow. The segments—especially the 5th, 6th, 7th, 9th, 10th, 11th, and 12th—are well divided by a line of this broom-yellow colour. Head yellowish-green. Legs, claspers, and under surface the same mottled green as above. The green oblique marks referred to in the preceding stage meet on the centre of the anal division of each segment in a V, each arm of the V being slightly curved outwards, and then inwards, before meeting. An interrupted, white, medio-dorsal line runs along the back of each segment, beginning with the 2nd and intersecting the angles of the V-shaped marks. The caterpillar is further ornamented by a supra-spiracular dark green line along each side, bordered below by a silvery-white line, especially distinct on the 2nd, 3rd, 4th, and 5th segments. In the last stages there are two or three short, dark, and scattered hairs emitted from the dorsal area of each segment.

Pupation begins about the 20th of June. My notes show that all my larvæ had disappeared in the soil by the second week in July. The moths appeared early in the following March: my diary for 1890 gives the time between the 6th and 22nd. In the Chester district, owing to the cold weather last spring, I did not find the sallows in bloom before the 15th, and even then only in sheltered places. Some allowance must therefore be made for the early emergence of the bred insect, as "it appears *with* the sallows, three or four days after they come out; the same temperature produces both" (Dr. Chapman).

It will be seen that *P. leucographa* remains in the pupal state about eight months. To keep pupæ for that length of time in a healthy condition is not a very easy matter, and it occurred to me that as close an imitation as possible of natural conditions would be most likely to lead to success. I placed the pots on a brick

floor, out of doors, against the north aspect of a wall, and had the satisfaction of seeing evidence—in the germination of chick-weed seeds, &c.—of a continued natural moisture so necessary under the circumstances. In February and March the glasses were occasionally taken off, the pots treated to a gentle shower of rain, exposed in the sunshine, and so on.

I can add little to Newman's graphic description of the moth. The fore wings are deep brickdust-red,—in fact, mahogany colour,—sparingly dusted with grey scales. The orbicular and reniform are clearly marked out in whitish grey, the orbicular being filled in with a darker shade of grey. The reniform is transversely lengthened, and is composed of two lobes clearly defined in whitish-grey, the upper lobe being filled in with the same darker grey as the orbicular, the lower one with dark brown, almost black. This lower lobe is almost concolorous with a dark transverse shade of the wing-colour, which, beginning on the costal margin, surrounds the discoidal spots, and widens out so as to include nearly the whole of the inner margin. There is a marginal dark brown band of the same shade as that in the lower reniform lobe; and two very indistinct lines of spots, darker than the ground colour, cross the wing, the first before the orbicular, the second beyond the reniform. The hind wings are light grey, a shade darker than those of *Tæniocampa miniosa*; in Newman's figures they appear almost identical. A smoky shade increases towards the outer margin, and terminates in a delicately marked mahogany-coloured line. The wing-rays are dark and smoke-coloured. These hind wings show a rosy, iridescent tint. All the wings have a glossy appearance, and the ample fringes are beautifully tinted with rose-colour.

The antennæ of the female are simple; those of the male are very slightly pectinated. "The palpi are short" (Newman). The thorax is densely clothed, and of the same colour as the fore wings. The body is of the same grey as the orbicular interior, and slightly tufted anally and on the sides with the rosy colour of the wing-fringes.

Chester, January 3, 1891.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. PERRY COSTE, F.C.S., F.L.S.

(Continued from p. 15.)

V.—THE CHEMICAL ASPECT. F. (*concluded*).

SPECIMENS of *A. caia*, *E. jacobææ* and *C. nupta*, were then subjected to strong HCl for one hour. They were instantly yellowed, of course. Washing restored a faint reddish tinge, which quickly disappeared. Finding them after one to two hours

still acid to the tongue, I again washed, and with this result: *jacobææ* became red; *nupta* flesh colour; *caia* remaining still nearly yellow. But on examining them after three days, they were all of the *natural red*: after another four days they were still the same, and finally, at the end of another week, the red was still permanent. Here the observations were stopped.

Wings of *S. ocellatus* and *P. apollo* (which had already been once yellowed by HCl and had afterwards recovered their full natural colour) were treated just as the foregoing three species. The first washing restored the full red to *apollo*, and the pink somewhat to *ocellatus* (entirely removing the yellow anyhow). A week later *apollo* was found still of its full natural colour, *ocellatus* being a very faded slightly pink tint (the colouring matter probably having been nearly all removed by this time). The lapse of another week produced no difference, the restored natural colours being permanent.

Now these experiments had already clearly proved several points: firstly, that the reversion was not due to treatment with alcohol; and secondly, that the whole secret lay in *removing the acid*—in which fact alone there evidently lay the virtue of washing the wings; so that the yellow was permanent only so long as the wing was actually acid. Here was an entirely novel and unlooked-for phenomenon,—something quite different from any former experience with other insect colours; and I would draw the reader's special attention to this peculiarity, to which I must revert when seeking to explain these results. Thirdly, it is clearly proved, so far, that the yellow produced by nitric acid is permanent and immovable. The question then arose: Which is typical of acid behaviour generally, HCl or HNO₃? This could only be settled by further experiment. Fourthly, it was at present somewhat uncertain how far washing could be altogether dispensed with, and the same result obtained as a mere time effect.

Wings of *Z. filipendulæ* were treated with dilute sulphuric acid (about 45 per cent.) for (A.) one hour and (B.) two hours. A., on being washed, was restored to a very faded red, which was still permanent after seven days. B. was also restored in the same way; examined two hours or so later it was found fairly yellow, and acid to the tongue; further washing restored it to the full red, which was still permanent in seven days' time. A wing of *S. ocellatus* was treated as A., and washing restored a little pink (?), which was unaltered seven days later.

These fresh results clearly pointed to the necessity for further investigation, and I therefore determined on an extensive set of experiments, in order to thoroughly clear up this question. Wings of the following six species were selected, viz., *V. atalanta*, *Z. filipendulæ*, *E. jacobææ*, *Deiopeia bella*, *C. hera*, and *C. nupta*,

—and treated with some or all of the following acids:* Hydrochloric (HCl); Nitric (HNO₃); Sulphuric (H₂SO₄); Phosphoric (H₃PO₄); Hydrofluosilicic (H₂SiF₆); and Oxalic (C₂H₂O₄).

Each experiment was made in duplicate, in order to ascertain (A.), the effect of simple washing; (B.), the *time effect*, if any. I must explain, however, that finding the process of washing exceedingly tedious, owing to the large quantity of water required in order to remove every trace of the acid, I had modified the process to this extent, that, after a slight wash, I added a drop of ammonia to neutralise the residual acid, and again gave a slight wash; this constituted in every way a great improvement in the method.

The following experiments then were made (in duplicate):—

<i>V. atalanta</i>	HCl	HNO ₃	H ₂ SO ₄	H ₂ SiF ₆	H ₃ PO ₄	—
<i>Z. filipendulæ</i>	—	—	H ₂ SO ₄	H ₂ SiF ₆	—	C ₂ H ₂ O ₄
<i>E. jacobææ</i>	HCl	HNO ₃	—	H ₂ SiF ₆	—	—
<i>D. bella</i>	HCl	—	—	H ₂ SiF ₆	—	—
<i>C. hera</i>	HCl	HNO ₃	H ₂ SO ₄	H ₂ SiF ₆	—	C ₂ H ₂ O ₄
<i>C. nupta</i>	HCl	HNO ₃	H ₂ SO ₄	—	—	C ₂ H ₂ O ₄

We will take first the A. batch. These were started on June 8th, treated with acid for one hour, and then washed and neutralised and again washed, as above described. The following are the results:—

<i>V. atalanta.</i>	} In each species the HNO ₃ specimen remained perfectly yellow. All the others reverted to red.	Not the least reversion in any case.
<i>Z. filipendulæ.</i>		
<i>E. jacobææ.</i>		
<i>C. hera.</i>		
<i>C. nupta.</i>		

These reverted specimens were allowed to stand until July 25th, when the red was found still permanent in all of them (as also in *Deiopeia bella* HCl and H₂SiF₆). Here, therefore, this part of the experiment terminated.

The following notes were made on the behaviour of these red wings:—

In *C. nupta* the reversion was the least thorough.

In *hera* and *jacobææ*, treated with HCl, the red when restored was not the exact natural red, but rather more cerise (or in *hera* mauve-cerise); and in the case of *hera* this cerise tint was permanent.

All these reds dissolved a little† (*nupta* least so), but not in HNO₃ more than in, e.g., HCl.

The behaviour of *atalanta* red is altogether abnormal, and entirely different from that of all the others: in which circumstance we have another proof that its constitution is different from that

* For strength of these see pp. 184, 185, of vol. xxiii.

† See Entom. xxiii. p. 372.

of other reds. Its red *dissolved* in the acids (except apparently in H_2SiF_6) just as, *e.g.*, *urticæ* chestnut does; and in consequence of this it was, of course, *entirely impossible to restore* the red by washing and neutralising. The further consideration of this exceptional and interesting species I am purposely deferring until after we have considered the nature of the *chestnut* pigment, from which, and *not from yellow*, the *atalanta* red is, I think, certainly derived.

We will now return to the B. batch. These (the duplicates of A.) were started on June 1st. (except the *Deiopeia* wings, which were started a week later). After one hour's exposure, the acid was *simply poured off*, as completely as possible,—the wings *not being washed or neutralised at all*,—and the watch-glasses (to which the wings were gummed) were then inverted and left standing on gauze-covered box-lids; the object of this treatment was to ensure that, in the first place, the residual acid (which of course cannot be poured off) should have an opportunity of running off the wing instead of accumulating on it, as would be the case if the wing were left in the lowest position (*i.e.*, in the centre of a concave watch-glass); and, in the second place, to ensure the access of plenty of air, and, in fact, secure ventilation; for it appeared to be possible that air might *slowly* produce the same effect as washing does quickly.*

These wings were left alone for many weeks, or in some cases months, and the following are the entries made at intervals in my note-book, as to the progress of the experiments:—

June 8th (one week). *None* of these wings show the least reversion to red as yet.

June 22nd (3 weeks, except for *D. bella*, 2 weeks). The following show *no signs* of reversion to red:—

V. atalanta. HCl , HNO_3 , H_2SO_4 , H_2SiF_6 (= all).

C. hera. HCl , HNO_3 , H_2SO_4 , H_2SiF_6 , $\text{C}_2\text{H}_2\text{O}_4$ (= all).

C. nupta. HCl , HNO_3 , H_2SO_4 , $\text{C}_2\text{H}_2\text{O}_4$ (= all).

Also *E. jacobææ*. HNO_3 .

Z. filipendulæ. H_2SO_4 .

The following have somewhat reverted to red:—

Deiopeia bella HCl (after 2 weeks, that is).

E. jacobææ. HCl (and H_2SiF_6 : this had been originally the least completely yellowed).

The following have *entirely reverted to red*:—

Z. filipendulæ. HCl ,† H_2SiF_6 (emphatically so).

August 3rd (9 weeks). The above-noted reversions are permanent (*viz.* *filipendulæ*, HCl † and H_2SiF_6).

* This is what I mean by the "time effect,"—not the most happily chosen term, I admit.

† This is the entry in my note-book: but it must be a *lapsus pennæ* intended almost certainly for H_2SO_4 .

The partial reversions of *Deiopeia* HCl, and *E. jacobææ*, HCl, have now become complete reversions to the natural red.

The partial reversion of *jacobææ* H_2SiF_6 is still only in the intermediate condition.

And in addition the following reversions have also occurred:—

Deiopeia bella. H_2SiF_6 , pretty fairly red (pink).

C. nupta. HCl, almost fleshish.

C. hera HCl, a red (*i. e.*, not quite the natural red; *cp. supra*).

Here, owing to the pressure of other work, my observations were discontinued, and the experiments were left to themselves for several months. The following observations were made on November 5th:—

Z. filipendulæ. H_2SO_4 , red.

E. jacobææ. H_2SiF_6 , reversion to red never completed.

D. bella. H_2SiF_6 , red (pink).

C. hera. HCl, deep red; H_2SiF_6 and $\text{C}_2\text{H}_2\text{O}_4$, fairly red. H_2SO_4 , red not recovered; but the wing not so much yellow as transparent.

C. nupta. HCl and $\text{C}_2\text{H}_2\text{O}_4$, a tolerable red. H_2SO_4 , reddish orange.

Finally, a last observation on Nov. 30th showed—

C. nupta. HCl, H_2SO_4 , $\text{C}_2\text{H}_2\text{O}_4$: all fairly red, or at least deep flesh.

C. hera. $\text{C}_2\text{H}_2\text{O}_4$ and H_2SiF_6 , also red.

As to the remaining experiments, I should say that two (of which it may be noticed that no record is given above), *viz.*, *Z. filipendulæ*, H_3PO_4 and $\text{C}_2\text{H}_2\text{O}_4$, came to an early and untimely end; whilst the *atalanta* experiments, in which it was perfectly clear that no reversion ever could take place, were abandoned after a few weeks' standing. Were it not entirely superfluous and unnecessary as evidence for what I had already abundantly proved, there would be considerable interest and importance attaching to the fact that two of the nitric-acid specimens, *viz.*, *hera* and *nupta*, which had been allowed to remain for over five months, were still *as yellow as a lemon*, although not the least acid could be detected in them by that most sensitive test of—the tongue.*

I may add that, complete as the evidence for reversion now seems to be, fresh data are accumulating; for now, in experimenting on the various red species that have been sent to me, I make a rule of ascertaining afterwards the reversion behaviour. It is, however,—at least for the present purpose,—hardly necessary to add anything to what is stated above.†

* It is not uninteresting that in—at least some—cases where the red colour is restored, it could be seen that the other side of the wing, *viz.*, that gummed to the glass, remained still yellow.

† I was anxious to know whether or not it would be possible to restore the red of *Delias*. I therefore touched it with a drop of acid, and then *instantly* washed copiously with water: the result was a return of a faded washed-out red. Considering the rapid and easy solubility of the pigment here, this was certainly as much as could be expected.

It now only remains to sum up the facts arrived at above, and then to endeavour a satisfactory explanation of them. First of all, the facts are these;—Putting aside altogether for the present the anomalous case of *Vanessa atalanta*, all reds are instantly or rapidly changed to yellow by any tolerably strong acid. If the acid used be nitric acid, the yellow so produced is *permanent*, and by no possible means can the original red be restored. In the case of every other acid, however (even in several instances after a week's exposure to the acid), the red may be restored by copious washing with water; or, better still, by neutralisation with ammonia and a slight washing. The same effect may be brought about by a longer or shorter exposure (to the air), without any washing or neutralisation at all. The resuscitated reds are usually of the natural tint, but in one or two cases may be somewhat different; and this difference is sometimes permanent (*Callimorpha hera*, e.g.). These resuscitated reds may be again yellowed by acids, the red again restored, and, in fact, this process repeated several times. With the exception of HNO_3 specimens, the yellow colour produced is entirely *dependent upon the presence of acid*; and the efficacy of neutralisation, washing, or air-drying, consists simply in the rapid or slow removal of such acid; as soon as the acid is gone, the red is recovered.

Now for the explanation:—I will not trouble the reader with any prefatory generalities, but will state at once the explanation which I have provisionally adopted until either it be disproved or a better found. Let us denote the molecule of red pigment by X: when any acid (except nitric) is added, I assume that this forms with X a so-called *molecular* compound: for instance, if we add hydrochloric acid we obtain a *hydrochloride* of X^* — $\text{X}.\text{HCl}_n$. Such molecular compounds are very common both in organic and inorganic chemistry, and are of various degrees of stability or instability. The most interesting examples, however (as bearing on our present purpose), are perhaps the various salts of the alkaloids,—as, for instance, quinine (hydro)sulphate and morphine hydrochloride; but still more emphatically interesting is the trihydrochloride of rosaniline, as will appear directly.

Now, since we do not know anything of the *ultimate* nature of anything, we of course cannot explain why the molecule should be red, and the $\text{X}.\text{HCl}$, &c., yellow; but we do find that this *is so*, and our ignorance equally disqualifies us for being in the least surprised that such should be the case.

Next for the resuscitation of red:—We must suppose (as I

* Note carefully, *not* a chloride (XCl) which would be produced by double decomposition (as, for instance, $\text{XY} + \text{HCl} = \text{XCl} + \text{HY}$), and would be, of course, far more stable. Real molecular compounds are necessarily comparatively unstable: one of the most familiar instances is that of water of crystallisation in a salt: the union of the salt and the water molecules is of the nature of a molecular compound.

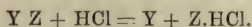
have already said) —what is certainly to all appearance very clear —that these compounds of X and an acid are highly unstable. Now it is one of the most familiar facts in chemistry that unstable compounds may be decomposed or resolved into their generators by (an excess of) *water*. This applies not only to molecular compounds, but even to true salts also. One or two instances may serve to render this clear to the non-chemical reader: for example, arsenious acid and hydrochloric acid form arsenious chloride, but this is subsequently decomposed again by water; and a *precipitate* of phosphate of alumina may be decomposed, by excessive washing with water, into free phosphoric acid and aluminic hydrate. But out and away the most interesting example for our purpose is that of the tri-hydrochloride of rosaniline above mentioned: this is a brown dye (the mono-hydrochloride is *magenta*), and *very unstable, being at once decomposed by water*.

After this, further justification for my explanation of the red-yellow phenomenon seems superfluous; but there remains to be explained the gradual restoration of red by air-drying. As to this, we can only suppose that the highly unstable molecules of $X.HCl_n$, &c., are also gradually decomposed by some such process as that of oxidation. I may perhaps, at some future time, be able to throw further light upon this interesting subject.

We have, in conclusion, but to dispose of the HNO_3 phenomenon. It may be thought, perhaps, that this exceptional phenomenon is a grave difficulty in the way of my explanation; but that were entirely an error. Nitric acid is an acid *per se*; and it is not in the least surprising that a reagent notoriously so powerful and destructive should have a far more potent and permanent effect than other acids. There can be very little doubt that nitric acid does not form a hydro-nitrate comparable with the compounds previously referred to, but exercises an action of an oxidative nature, resulting in a permanent alteration of the structure of the X molecule —forming a stable oxidation product.* This being so, it is obviously out of the question to expect any decomposition from treatment with water, even though we had Niagara at our command.†

* Glycerine, under certain circumstances, will react with nitric acid to form glycerine nitrate ("nitro-glycerin"—dynamite); but under other conditions it is completely oxidised up to glyceric acid, &c.

† The explanation proposed as to the mode of action of the other acids on the red pigment might be stated in somewhat different terms, although leading practically to the same result. Suppose we start with the original *yellow* pigment: call that Y. Suppose the red pigment to be developed by the union of Y with another molecule of (—?) = Z: then the red pigment will be represented by YZ. Suppose the action of an acid—say hydrochloric—be to decompose this, thus:—



Thus we get the original yellow pigment Y in evidence again. The action of water would be to decompose Z.HCl again, so liberating the molecule Z to re-combine with Y, thus re-forming the pigment YZ. Since the equation by which we

And here I think we may conclude this very lengthy sub-section, and for the present take leave of the two most interesting and instructive colours that it has been my fate to meet with during the course of this investigation.*

(To be continued.)

ON THE OCCASIONAL ABUNDANCE OF CERTAIN SPECIES OF LEPIDOPTERA.

BY ROBERT ADKIN, F.E.S.

A THEORY founded upon such careful observations as are recorded by Mr. W. W. Smith, in his able article on the 'Abundance of Lepidoptera in New Zealand' (Entom. xxiii. 305), is of considerable value in elucidating this interesting problem, not only in its bearing upon such phenomena in that district, but equally so in other parts of the world. As this gentleman has kindly referred to, and commented upon, a paper on a similar subject for which I am responsible, an abstract of which appeared in this journal (Entom. xxiii. 177), I propose to offer a few further remarks on the matter.

The drift of Mr. Smith's argument appears to be directed towards showing that seasons productive of luxuriant vegetation are favourable to the abundant development of Lepidoptera. Thus he says, "Less snow fell in the higher Alps (New Zealand) during the winters of 1888 and 1889 than for the previous twelve years, while the meteorological records show a corresponding mildness of temperature, and a considerable diminution of north-west or snow-melting winds. The summers following, each have been dry and hot, and naturally adapted to the life-habits of Lepidoptera; *all species* I observed during the past season, from the earliest spring-appearing species to those which appeared in late autumn, *emerged in great numbers*, and were all beautifully-developed insects." (The italics are mine.) I may say at once that I fully agree with the foregoing; it has always been my opinion, and in this I believe I am by no means singular, that certain meteorological conditions are favourable to

represent the reaction is entirely hypothetical, and no more or less hypothetical in the one case than in the other, it is entirely immaterial which explanation we adopt: the broad result is the same in either case, and my readers are perfectly welcome to follow their own inclinations as to whether they amuse themselves by adopting the equations given in the text, or the alternative offered here.

* It may be surmised that I have forgotten my promise to fight out to the bitter end my amicable controversy with Mr. Cockerell as to the genetic relations of white, yellow, and red. I may assure my readers, however, that I am—like Scott's hero—*haud immemor*. But the matter is deferred for the present, not merely because this sub-section is already so immoderately long, but also because there are involved in such a discussion various entomological arguments which can be more fitly introduced in Section VI., on the biological aspect.

the development of Lepidoptera in abundance, while others tend in an opposite direction. But this would apply, and as Mr. Smith tells us in this case did apply, to the great majority of species; whereas the particular point that I sought to follow up was the cause of the unusual abundance of one or two particular species in seasons when the great majority of species were scarce.

Whether cases of *sporadic* abundance, such as I have indicated, occur in New Zealand, I am not fully aware, but I gather from the writings of Messrs. W. W. Smith and G. V. Hudson that they are not altogether unknown; and I think we should not too hastily assume that migration can have no bearing upon them, or even upon the abundance or otherwise of Lepidoptera generally. Mr. Smith tells us that, "The main facts adduced to account for the occasional abundance of certain species in the British Islands will not fully apply to the same phenomena in New Zealand," because, as he explains, "the British Islands and New Zealand are both insular areas; but while the former is separated only by a few miles from the European Continent, the latter is situated at least one thousand miles from the Continent of Australia." And further, that "the migration theory, as explained by Mr. G. V. Hudson (Entom. xxiii. 133), can have no bearing on the question in New Zealand." I cannot admit that this greater distance would form an insurmountable obstacle to immigration; if it were so, it seems highly improbable that that essentially New World species, *Anosia plexippus*, would have reached Great Britain (Proc. South Lond. Entom. Soc., 1886, pp. 17, 42, 60); and, except for this greater sea-space, the relative position of the British Islands and New Zealand to their respective continental bases are singularly alike. As the former occupies the position of the western boundary of the Asio-European region, so the latter forms the eastern extremity of the Indo-Australian: the lepidopterous fauna of the British Islands is essentially that of its continental base, and that of New Zealand, so far as it has been investigated, appears to belong to the Indo-Australian region. That migrations of Lepidoptera from the continental portion of the European area to the British Islands do occur has already been shown, and is it not reasonable to suppose that a similar condition of things exists in regard to New Zealand?

It is not many years since the annual migration of birds to and from the British Islands was regarded by many as nothing more than a wild theory, but thanks to careful and persistent observation we now know it to be an established fact; in the course of these observations material has been gathered which points to the conclusion that the occasional migrations of Lepidoptera follow the routes taken by the birds in their annual movements. Should this ultimately prove to be so, a case of bird migration recently reported from Tasmania should be of

value as indicating a probable direction in which lepidopterous migrations should be sought in the southern hemisphere.

In the 'Papers and Proceedings of the Royal Society of Tasmania for 1889' is a paper by Colonel W. V. Legge, R.A., dealing with the Australian curlew, which species, he tells us, migrates north through the Malay Archipelago, being there met with on passage in Borneo, New Guinea, the Philippines, and other islands, and that New Zealand seems to be its eastern limit.

It is on the limits of a great faunistic region that the species inhabiting that region are least likely to maintain a permanent footing; consequently it is there that we may most reasonably expect their abundance to be affected in the greatest degree by the influence of migration.

Lewisham, S.E., February 10, 1891.

LEPIDOPTERA FOUND IN BRITAIN AND AMERICA.

BY RICHARD SOUTH.

IN his 'Bibliographical Catalogue of the Described Transformations of North American Lepidoptera'† Mr. Henry Edwards gives copious references to the published descriptions of the early stages of 1069 species of Lepidoptera occurring in North America. Seventy-nine of the species enumerated are found in Britain, and as the majority of these are well known, a list of them may be of interest to entomologists of this country.

For present purposes it has been thought sufficient to give the first British and first American reference cited by Mr. Edwards in those instances where any stage in the early life-history of a species has been noted by authors in both countries. The second date is, in all cases, the American one. Where only one date is given in this list the name of the authority is added, and an asterisk is used to denote the American.

The nomenclature adopted by Mr. Edwards, when different to that used in this country, is placed in brackets.

RHOPALOCERA.

- Papilio machaon*, L. (var. *aliaska*, Scud.), 1884, W. H. Edwards.*
P. napi, Esp., 1828, 1886. *P. rapæ*, L., 1828, 1869.
Vanessa antiopa, F., 1828, 1841. *V. (Pyrameis) atalanta*, L., 1828, 1862. *V. (Pyrameis) cardui*, L., 1828, 1854.

HETEROCERA.

SPHINGES.

- Deilephila livornica* (N. A. form *lineata*), 1797, Abbot-Smith.*
Trochilium apiformis, L. (*apiforme*), 1828, Stephens.
Sesia (Ægeria) tipuliformis, L., 1828, 1839.

† 'Bulletin of the United States National Museum.' No. 35.

BOMBYCES.

Sarothripus undulatus, Hübn. (*Sarothripa reveyana*, S. V.), 1859, Stainton.

Zeuzera pyrina, L. (*æsculi*, L.), 1829, Stephens.

NOCTUÆ.

Arsilonche albovenosa, Götze (Grote), = *henrici*, Gr. 1877, Thaxter.*

Leucania extranea (*Heliophila unipuncta*, Haw.), 1860, J. Kirkpatrick.

Hydræcia (*Apamea*) *nictitans*, Bork., 1859, Stainton.

Apamea immanis, Guen., 1884, T. J. Edge.* (? = *Hydræcia petasitis*, Doubl.).

Dipterygia scabriuscula, L., 1829, Stephens.

Apamea gemina, Hübn. (*Hadena remissa*, Hübn.), 1882, Kirby.

Agrotis suffusa, Hübn. (*ypsilon*, Rott.), 1829, 1869. *A. saucia*, Hübn., 1859, 1869.

Noctua (*Agrotis*) *plecta*, L., 1829, Stephens. *N.* (*Agrotis*) *c-nigrum*, L., 1829, 1877. *N.* (*Agrotis*) *baia*, Fabr., 1829, Stephens.

Amphipyra (*Pyrophila*) *tragopogonis*, L., 1829, 1870.

Taniocampa incerta, Hufn., 1859, 1856.

Euplexia lucipara, L., 1829, 1883.

Aplecta (*Agrotis*) *prasina*, Fabr., 1859, Stainton. *A.* (*Agrotis*) *occulta*, Hübn., 1829, Stephens.

Hadena (*Mamestra*) *trifolii*, Rott., 1882, 1881.

Gonopteryx (*Scoliopteryx*) *libatrix*, L., 1829, 1881.

Anarta cordigera, Thnb., 1859, Stainton.

Heliothis armigera, Hübn., 1859, 1855.

GEOMETRÆ.

Eugonia autumnaria, Wernb. (*Ennomos alniaria*, Esp.), 1859, 1876.

Packard quotes Goddell and Scudder in litt.

Metrocampa margaritaria, L., 1859, Stainton.

Numeria (*Anagoga*) *pulveraria*, L., 1869, 1876. Packard quotes Merryfield.

Tephrosia (*Cymatophora*) *crepuscularia*, Hübn., 1859, 1878.

Melanippe (*Rheumaptera*) *fluctuata*, L., 1859, 1876. Packard quotes

Newman. *M. (R.) unangulata*, 1859, 1876. Packard quotes Newman.

M. (R.) tristata, L., 1859, 1876. Packard quotes Newman. *M.*

(*R.*) *hastata*, L., 1829, 1885.

Coremia (*Ochyria*) *ferrugata*, L., 1859, 1876. Packard quotes Newman.

C. (O.) munitata, Hübn., 1869, 1876. Packard quotes Newman.

C. (O.) designata, Hübn., 1859, 1880.

Cidaria (*Petrophora*) *testata*, L., 1859, 1876. Packard quotes Newman.

C. (P.) prunata, L., 1859, Stainton. *C. (P.) truncata*, Hübn.,

1869, 1876. Packard quotes Newman.

Hypsipetes (*Hydriomena*) *sordidata*, Fabr., 1869, 1876. Packard quotes Newman.

Oporabia (*Epirrita*) *dilutata*, Bork., 1869, 1858.

Venusia (*Epirrita*) *cambricaria*, Curt., 1869, 1876. Packard quotes Newman.

Campptogramma (*Plemyria*) *fluviala*, 1858, 1876. Packard quotes Newman.

Larentia (Glaucopteryx) cæsiata, Lang, 1859, 1876. Packard quotes Newman.

Eupithecia absynthiata, L., 1859, 1876, Packard quotes Crewe.

PYRALIDES.

Pyralis (Asopia) farinalis, L., 1859, 1841. *P. (A.) costalis*, Fab., 1870, T. Glover.*

Ephestia elutella, Hübn., 1859, Stainton.

Plodia (Ephestia) interpunctella, Hübn., 1859, Stainton.

Aphomia sociella, L. (*colonella*), L., 1868, Packard.*

Galleria mellonella, L. (*mellinella*, Fabr.), 1836, 1841.

TORTRICES.

Peronea (Teras) hastiana, L., 1859, Stainton. *P. (T.) permutana*, Dup., 1881, Coquillett.* *P. (T.) ferrugana*, Tr., 1859, Stainton.

Tortrix (Cacæcia) rosana, L., 1859, Stainton. *T. (Lophoderus) ministrana*, L., 1859, Stainton.

Dictyopteryx (Tortrix) bergmanniana, L., 1837, Westwood.

Cnectra pilleriana, Schiff., 1859, Stainton.

Chrosis (Conchylis) rutilana, Hübn., 1859, 1878.

Retinia sylvestrana, Curt., 1859, Stainton.

Bactra lanceolana, Hübn., 1859, Stainton.

Penthina capreana, Hübn., 1859, Stainton.

Hedya (Tmetocera) ocellana, Schiff., 1859, 1841.

Hypermercia (Steganoptycha) angustana, Hübn., 1859, Stainton.

Phoxopteryx (Phoxopteris) lundana, Fabr., 1859, Stainton.

Carpocapsa pomonella, L., 1837, 1819.

TINEÆ.

Tinea tapetzella, L., 1859, 1864. *T. pellionella*, L., 1859, 1841.

Tineola (Tinea) biselliella, Hml., 1859, Stainton, Clemens.*

Scardia (Tinea) granella, L., 1837, 1841.

Hyponomeuta evonymella, Chambers = (? *evonymella*, Scop. Sta.), 1872, Chambers.*

Plutella cruciferarum, Zell., 1856, Fitch* (as *C. brassicella*).

Depressaria heracliiana, De Geer, 1859, 1869.

A PRELIMINARY LIST OF THE INSECT-FAUNA OF MIDDLESEX.

COMPILED BY T. D. A. COCKERELL.

(Continued from p. 33).

SINCE the publication of the last part, a number of valuable records have been received, as follows:—

(14.) Arthur J. Chitty. A MS. list of Coleoptera and Lepidoptera, taken at Hatton and other localities.

(15.) Charles W. Watts. A MS. list of Lepidoptera, from the district N.W. of London, taken from 1865 to 1884. The

"garden at South Hampstead," mentioned, is in the King Henry's Road.

(16.) Hy. Rowland-Brown, Jr. A MS. list of Zygaenidæ and Bombyces, observed in North Middlesex.

(17.) Geo. Wall. A MS. list of Lepidoptera taken at Harefield, 1880 to 1890.

A few additions should be made to the lists published. Mr. Francis C. Woodbridge writes that *Crabro interruptus*, DeG., occurs in his garden at Uxbridge. Mr. C. W. Watts adds *Argynnis euphrosyne*, L., "which was, and probably still is, common in the woods about Pinner and Ruislip;" and *Nisoniades tages*, L., "common at Ruislip, in meadows." He also remarks that *Epinephele hyperanthes* is abundant in the same localities as *A. euphrosyne*, "with a strong tendency to var. *arete*, though I never got one altogether spotless." Mr. Rowland-Brown adds *Thecla w-album*, Knoch, "a single specimen, taken in 1887 by Mr. Peers, on the lawn at Harrow Weald Rectory;" and Mr. Geo. Wall gives me notes of *Deilephila livornica*, Esp., Harefield, one in 1884; and *Chærocampa celerio*, L., Harefield, Aug. 1886, one specimen given to him by J. Milton.

Some other interesting notes have been sent, which will be useful for a list of addenda and new localities, to be prepared perhaps at some future date; but in such a list various new localities for the very common species will not be inserted, as they are scarcely of sufficient importance to justify the amount of space they would occupy. It is no doubt desirable that every parish in the county should have its fauna and flora catalogued accurately and in detail, but special information of this kind is best published by the local societies, and obviously cannot appear in full in a journal like the 'Entomologist.'

LEPIDOPTERA.

Sesiidæ.

Trochilium apiforme, Clerck, Hammersmith Marshes (Godwin). *T. crabroniforme*, Lewin, Hammersmith Marshes, olim (Godwin).

Ægeria tipuliformis, Clerck, generally common in gardens (Godwin); Isleworth (Meyers); Bedford Park, one at thistle flowers, July, 1886 (Ckll.); South Hampstead, common (Watts); St. John's Wood, common in some gardens where there are currant bushes, imago on sallow leaves, and on the pavement in Abbey Road, once (South); Clapton (Bacot); Dalston (Prout). *Æ. asiliformis*, Rott., Hyde Park (Godwin). *Æ. myopiformis*, Bork., generally common in gardens (Godwin); Isleworth (Meyers); Bedford Park (J. Gray); and one on a willow tree, Aug. 3, 1885 (Ckll.); South Hampstead (Watts). *Æ. formiciformis*, Esp.,

Hammersmith Marshes, common (Godwin). *Æ. culiciformis*, L., Isleworth (Meyers).

Zygænidæ.

Ino statice, L., Mill Hill, abundant on the common (South); Old Oak Common, sometimes (Godwin); Ruislip, June 10, 1883 (Watts); Harrow-Weald, L. & N. W. Railway bank, Pinner (Rowland-Brown); Harefield, common (Wall).

Zygæna trifolia, Auctt., Mill Hill, on railway bank (South); Ruislip, June 14, 1883 (Watts); Harefield, common (Wall). *Z. filipendulæ*, L., Mill Hill (South); Old Oak Common, in numbers (Godwin); Isleworth (Meyers); near Ealing (Ckll.); Ruislip (Watts); Harrow-Weald (Rowland-Brown); Harefield, very common (Wall).

Nycteolidæ.

Sarothripus undulatus, Hb., rare, Bishop's Wood (Godwin); Harefield, common (Wall); Mill Hill (South).

Earias chlorana, L., Hammersmith Marshes (Godwin).

Hylophila prasinana, L., Bishop's Wood, Hampstead, common (Godwin). *H. bicolorana*, Fues., rare, Hampstead (Godwin); Harefield, one specimen, bred from pupa found on a plant, 1887 (Wall).

Nolidæ.

Nola cucullatella, L., Mill Hill, larvæ very common, beaten out of hawthorn, sloe, &c. (South); generally common, especially larvæ (Godwin); South Hampstead (Watts); Harrow Weald (Rowland-Brown); Dalston, showing perhaps some melanic tendency (Prout). *N. strigula*, Schiff., near Uxbridge (J. E. Benbow, Entom. 1878, p. 21).

Lithosiidæ.

Nudaria mundana, L., Mill Hill, common in the garden, flying at night (South); Clutter House Lane (Godwin); Harefield, once taken (Wall). *N. senex*, Hb., Harefield, once taken (Wall).

Calligenia miniata, Forst., Bishop's Wood, Hampstead, common (Godwin).

Lithosia lurideola, Zinek., Mill Hill (South); Bishop's Wood, Hampstead (Godwin); Oxhey Lane (Rowland-Brown); Harefield, common (Wall). *L. complana*, L., Bishop's Wood, Hampstead (Godwin). *L. griseola*, var. *stramineola*, Dbl., two taken, 1887, at Harefield (Wall).

*Arctiidæ.**

Euchelia jacobææ, L., Mill Hill, two on the Common, 1876 (South); very common near Addison Road Station as recently as 1879 (Godwin); Isleworth, abundant (Fenn and Ckll.); Chis-

* Including as subfamilies *Eucheliinæ* (*Euchelia* and allies) and *Arctiinaæ* (*Arctia* and allies).

wick (*Miss E. Sharpe*); Bedford Park (*J. King* and *C. Rowland*); Pinner (*Watts*); Harefield, one taken, 1888 (*Wall*).

Euprepia caia, L., Mill Hill, common in the larva stage (*South*); generally common (*Godwin*); Isleworth (*Meyers*); Bedford Park (*Ckll.*); South Hampstead (*Watts*); Clapton (*Bacot*); Oxhey Lane (*Rowland-Brown*); Harefield, common (*Wall*). *E. villica*, L., Mill Hill, common in the larva stage (*South*); Old Oak Common, exceedingly common, West End Lane, Dollis Hill (*Godwin*); Isleworth (*Meyers*); Oxhey Lane (*Rowland-Brown*).

Spilosoma fuliginosa, L., Mill Hill, one specimen, 1876 (*South*); larvæ only, rare, Old Oak Common (*Godwin*). *S. mendica*, Clereck., Old Oak Common (*Godwin*); Hampstead, 1882 (*Watts*); Harefield, one taken, 1889 (*Wall*). *S. lubricipeda*, Esp., Mill Hill, common, flying just before dusk (*South*); generally common (*Godwin*); Isleworth (*Meyers*); Bedford Park (*Ckll.*); South Hampstead, larvæ (*Watts*); Clapton (*Bacot*); Oxhey Lane (*Rowland-Brown*); Dalston (*Prout*); Harefield, common (*Wall*). *S. menthastri*, Esp., Mill Hill, common, flying just before dusk (*South*); generally common (*Godwin*); Isleworth (*Fenn*); Bedford Park (*Ckll.*); South Hampstead, larvæ (*Watts*); Clapton (*Bacot*); Oxhey Lane (*Rowland-Brown*); Dalston (*Prout*); Harefield (*Wall*).

Hepialidæ.

Hepialus humuli, L., generally common (*Godwin*); Bedford Park, abundant (*Ckll.*); South Hampstead, common, second brood, Aug., 1881 (*Watts*); Clapton (*Bacot*); Oxhey Lane (*Rowland-Brown*); Tottenham (*Prout*); Harefield, usually common (*Wall*). *H. sylvanus*, L., Mill Hill (*South*); near W. Hampstead Station (*Godwin*); Hendon (*Watts*); Clapton (*Bacot*). *H. velleda*, Hb., Bishop's Wood (*Godwin*). *H. lupulinus*, L., Mill Hill (*South*); generally common (*Godwin*); Isleworth (*Fenn*); Bedford Park (*Miss E. Sharpe*); Hampstead and Hendon (*Watts*); Clapton (*Bacot*); Oxhey Lane (*Rowland-Brown*); Dalston (*Prout*); Harefield, abundant (*Wall*). *H. hectus*, L., Bishop's Wood, common (*Godwin*); Harefield, common, (*Wall*).

Cossidæ.

Cossus cossus, L. = *C. ligniperda*, Fb., Mill Hill, larvæ and pupæ, from an old ash, imago at sugar (*South*); Isleworth (*Meyers*); Hampstead (*Watts*); Clapton (*Bacot*); Oxhey Lane (*Rowland-Brown*); Tottenham (*Prout*); Harefield, two bred from larvæ, 1887 (*Wall*).

Zeuzera pyrina, L., Mill Hill (*South*); Bedford Park (*F. Fenn*, *Miss E. Sharpe*, and *Miss Gertrude Blogg*); South Hampstead, bred from larvæ in mountain ash (*Watts*); Clapton (*Bacot*); Dalston (*Prout*); Bloomsbury (*Brit. Mus.*).

Liparidæ.

Porthesia chrysorrhœa, L., Mill Hill (South); Isleworth (Meyers). *P. similis*, Fues., common generally (Godwin); Isleworth (Meyers); Bedford Park (F. Fenn and C. Rowland); Hampstead (Watts); Oxhey Lane (Rowland-Brown); Dalston (Prout); Harefield, common (Wall).

Leucoma salicis, L., common generally (Godwin); Bedford Park (Miss E. Sharpe); South Hampstead, larvæ on poplar (Watts); Clapton (Bacot); Dalston (Prout).

Ocneria dispar, L., near Uxbridge (J. E. Benbow, Entom. 1878, p. 21).

Psilura monacha, L., rare, Bishop's Wood, only larvæ (Godwin); Pinner Woods, 1881 and 1882 (Watts).

Dasychira pudibunda, L., Mill Hill (South); Bishop's Wood, moderately common (Godwin); Pinner Woods, and larvæ on Hampstead Heath (Watts); Harefield, one bred from larva, 1887 (Wall).

Orgyia antiqua, L., Mill Hill (South); generally common (Godwin); Bedford Park, a larva on *Salix*, 1886 (L. M. Cockerell); Clapton (Bacot); Oxhey Lane (Rowland-Brown); Dalston (Prout); Harefield (Wall); Isleworth, 1890 (Ckll.).

*Bombycidæ.**

Trichiura cratægi, L., Mill Hill, a few larvæ found each year on hawthorn and sloe (South); Pinner (Rowland-Brown).

Eriogaster lanestris, L., Mill Hill, many batches of larvæ found on sloe (South); Kingsbury (Godwin); Oxhey Lane (Rowland-Brown).

Clisiocampa neustria, L., Mill Hill (South); generally common (Godwin); larvæ common on *Cotoneaster* in garden, South Hampstead (Watts); Oxhey Lane (Rowland-Brown); Dalston (Prout); Harefield (Wall).

Bombyx rubi, L., Mill Hill, larvæ very abundant, 1875, a female at rest amongst grass, 1876 (South); Old Oak Common (Godwin). *B. quercus*, L., doubtfully quoted from Mill Hill (South). *B. trifolii*, Esp., Hampstead, one specimen (Rowland-Brown).

Odonestis potatoaria, L., Mill Hill, very plentiful in larval stage (South); generally common (Godwin); Isleworth (Meyers); Hampstead (Watts); Oxhey Lane (Rowland-Brown); Harefield, occasionally taken (Wall).

Lasiocampa quercifolia, L., Mill Hill, a few bred from larvæ found on sloe (South); one pupa spun up on a willow tree near Addison Road Station, place now built on; scrub bushes of white-

* Including as subfamilies *Bombycinæ* (*Bombyx* and allies) and *Saturniinae* (*Saturnia* and allies).

thorn, blackthorn, elm, and stumps of willows, pupa about six feet from ground (*Godwin*).

Saturnia pavonia, L., Isleworth (*Meyers*).

Drepanulidæ.

Drepana lacertinaria, L., Pinner Woods, Aug. 5, 1881 (*Watts*); Harefield, one taken, 1886 (*Wall*). *D. falcataria*, L., Chiswick, larva on birch (*Alfred Sich*). *D. biniaria*, Hufn., Mill Hill, one netted on the Common, 1875, and one bred from pupa found in spun leaf under an oak by the roadside, 1876 (*South*); Bishop's Wood, rare (*Godwin*); Hampstead (*Watts*). *D. cultraria*, Fb., Bishop's Wood, rare (*Godwin*); Hampstead, one larva (*Watts*).

Cilix glaucata, Scop., Mill Hill (*South*); fairly common (*Godwin*); Hampstead (*Watts*); Oxhey Lane (*Rowland-Brown*); Harefield, common (*Wall*).

Dicranuridæ.

Dicranura furcula, L., bred from larva, Hampstead Heath (*Watts*). *D. bifida*, Hb., Mill Hill, four bred from larvæ, 1875—6 (*South*); Harefield, once taken (*Wall*). *D. vinula*, L., common in the larval stage on willow, sallow, &c. (*South*); generally distributed (*Godwin*); Isleworth (*Fenn*); Bedford Park, larvæ on poplar (*Ckll.*); South Hampstead (*Watts*); Clapton (*Bacot*); Oxhey Lane (*Rowland-Brown*); Harefield (*Wall*).

Notodontidæ.

Pterostoma palpina, L., Oxhey Lane, at light (*Rowland-Brown*).

Lophopteryx camelina, L., Mill Hill (*South*); Hampstead (*Watts*); Harefield, one larva found, 1887 (*Wall*).

Notodonta dictæa, L., Mill Hill (*South*). *N. dictæoides*, Esp., Hampstead (*John Lea*, Entom. 1887, p. 275). *N. ziczac*, L., John Street, Bedford Row, London (*Meldola*, Entom. 1887, p. 235).

Pygæridæ.

Phalera bucephala, L., Mill Hill (*South*); Isleworth (*E. A. Ormerod*); Bedford Park, larva, and a wing in a web of *Epeira diademata* (*Ckll.*); larvæ abundant generally (*Watts*); Clapton (*Bacot*); Dalston (*Prout*); Harefield, taken occasionally (*Wall*).

Pygæra curtula, L., one specimen at Highgate (*Watts*).

Cymatophoridæ.

Cymatophora duplaris, L., Mill Hill, at sugar (*South*).

Asphalia diluta, Fb., Mill Hill, at sugar (*South*); Harefield, moderately common (*Wall*).

Thyatira derasa, L., Mill Hill, at sugar (*South*); Bedford Park (*C. Rowland*). *T. batis*, L., Mill Hill (*South*).

3, Fairfax Road, Bedford Park, Chiswick, W.

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

THE ENTOMOLOGICAL SEASON OF 1890:—

Notes from Ringwood.—In my notes of December (Entom. xxiii. 331) I gave an account of *Rhopalocera* taken here during last season, and now append further notes upon the moths and larvæ. Sugar here, as elsewhere, has been almost a failure, still by other means I have taken a fair number of species, and, upon the whole, I consider moths have been plentiful, only the rare species rarer than usual. A favourite mode of netting with me is to post myself under a thick willow or sloe growing in the hedges of lanes, and net any insect that hovers about; many Noctuæ and Geometræ may be taken this way. Some larvæ have been abundant here, especially species of the Lasio-campidæ; *Clisiocampa neustria* in thousands upon apple trees, bramble, &c.; on one tree I saw five batches feeding; *Lasiocampa quercus*, upon sloe; *L. callunæ*, upon heath; also *L. rubi*, of which I have about one hundred hibernating; *L. potatoria*, upon various grasses, and the imago very common; several times I have seen the females deposit ova upon the dead leaves of *Rubus fruticosus*, in clusters of four or five; other larvæ plentiful, which I will mention in due course. *Sphinx ligustri* (one); *Smerinthus tilia*, from willow; *S. populi*, common; *S. ocellatus*, willow; *Macroglossa stellatarum*, few seen at geraniums; *Trochilium bembeciformis* (one), larvæ in willow stems; *Hemaris (Macroglossa) bombyliiformis*, scarce; *H. (M.) fuciformis*, several, and many bred, some of the same set with the wings quite covered with rich brown scales; to obtain them in this way the imago must be killed almost immediately upon emergence, as at the least flight the wings become clear: *Sesia tipuliformis*, common in my garden; *Setina (Lithosia) mesomella*, in company with *Emydia cribrum* and *Pachy-cnemidion hippocastanaria*, common upon certain heaths. *Lithosia complanula*, common on the wing between ten and twelve, p.m.; *Gnophria rubricollis*, rather scarce, pupæ from moss upon oaks, the cocoon of which resembles *S. mendica*, only smaller; *Euchelia jacobæ* and larvæ, common; *Nemophila russula*, few; *Arctia caia* and larvæ abundant; *Spilosoma lubricipeda*, *S. menthastri* (common); *S. mendica*, female taken and sixty-seven pupæ obtained; males of *Orgyia antiqua* flying through the ridings in the forest; *Dasychira fascelina*, *D. pudibunda*, scarce; larva of *Ocnieria monacha*, few; *Porthesia auriflua*, *Hepialus lupulinus*, scarce; larvæ of *Psyche villosella*, fairly common, and now hibernating upon the heaths; to obtain these curious case-makers I go to the collecting ground about March or April, and if there are fir trees scattered about, search the trunks from one to two feet from the ground—it is a favourite position they take before pupating; falling trees, I have collected many from the ends of twigs of *Ulex europæus*, and in this position they greatly resemble the dead shoots with which the furze is usually covered: *Cilix glaucata*, common; also *Saturnia carpinii*; of this species I found two cocoons upon the tops of *Calluna vulgaris*, quite conspicuous; *Pæcilocampa populi* (one); *Pygæa pigra* and *Phalera bucephala*, common; *Cerura bifida*, at willow; *Cymatophora fluctuosa*, scarce; larva of *Asphalia*

ridens, about a dozen; *Diloba cæruleocephala*, larvæ very plentiful upon several shrubs; *Acronycta psi*, *Bryophila perla*, *Leucania pallens*, *L. conigera* (one of these has the hind wings golden); *L. lithargyrea*, *Caradrina morpheus*, *Grammesia trigrammica*, *Anchocelis lunosa*; at fallow bloom, *Teniocampa gothica*, *T. cruda*, *T. stabilis*, and *T. instabilis*; *Cosmia trapezina*, larva common; *C. affinis*, *C. diffinis*; *Scoliopteryx libatrix*, common; *Amphipyra tragopogonis*, scarce; last February and March I searched the herbage in the lanes for larvæ and found plenty, from which I have bred fine series of *Triphæna ianthina*, *T. interjecta*, *T. comes* (orbona), *T. pronuba*, *Habryntis* (*Phlogophora*) *meticulosa*, and others; I fed them up in a large bell-glass out of doors, and upon several occasions the lot were subjected to severe frosts, still it did not affect them, as few died: *Agrotis pophyrea*, on heath; *A. puta*, *A. segetum*, *A. saucia*, *Noctua c-nigrum*, *N. plecta*, *Axylia putris*, *Cerigo cytherea*, *Hadena* (*Miana*) *strigilis*, and numerous vars.; *H. (M.) furuncula* (two), and *Eremobia ochroleuca*; larvæ of *Miselia oxyacanthæ*, abundant upon hawthorn and sloe—I could have taken thousands; several bred; I was interested in the curious cocoons they form—quite an earthen wall between two layers of silk: *Dianthæcia carpophaga* and larvæ, common; also *Hadena* (*Xylophasia*) *monoglyphæ*, *Mormo* (*Mania*) *maura*, *Nænia* (*M.*) *typica*, *Xylocampa areola*, and *Cucullia lychnitis*, *Anarta myrtilli* and larvæ, common; *Abrostola tripartita* (*urticæ*), bred from pupæ found; *Plusia chrysis*, abundant; *P. iota*, *P. gamma*, scarce; *Prothymia* (*Phytometra*) *viridaria*, common; *Zanclognatha nemoralis*, *Z. tarsipennalis*, *Herminea* (*Pechypogon*) *barbalis*, *Hypena proboscidalis*, and *H. rostralis*; larvæ of *Halias prasinana* beaten from oak; *H. quercana* and pupæ, from oak in autumn. The Geometræ fairly represented, some species quite plentiful; *Urapteryx sambucata*, common; I saw a female deposit a large number of ova upon a grass stem underneath hawthorn, and several yards away from ivy; *Ellopia prosapiaria* (two), *Metrocampa margaritaria*, *Odontopera bidentata*, common; *Epione advenaria*, one male; *E. parallelaria*, local; *Bapta bimaculata*, *Macaria liturata*, common; *Eugonia erosaria*, *E. fuscantaria*, *Selenia bilunaria*, *Himera pennaria*, *Crocallis elinguaris*, larvæ common upon sloe; *Pericallia syringaria*, common; also larvæ upon honeysuckle; *Rumia luteolata*, *Abraxas grossulariata*, *Ligdia marginata*, *Hemerophila abruptaria*, and *Thamnionoma wavaria* (*Halia vauaria*), all plentiful; *Cheimatobia brumata*, *C. boreata*, *Hybernia defoliaria*, *H. aurantiaria*, bred; *H. leucophearia*, in great variety; the restless little *Odezia atrata* was to be seen in profusion; also *Venilia macularia*, *Fidonia* (*Bupalis*) *pinaria*, and *Ematurga atomaria*, common; *Cleora lichenaria*, *Tephrosia rhomboidaria*, *T. consonaria*, *T. crepuscularia*, and *Pseudoterpna pruinata*, common; *Acidalia emarginata*, *Timandra amatoria*, *Biston hispidaria* (one), larvæ scarce; *Anaitis plagiata*, common; *Ortholitha* (*Eubolia*) *cervinata*, larvæ abundant upon mallow; *O. (E.) limitata*, *Anticlea badiata*, *Scotosia* (*Eucosmia*) *undulata* (two); *Larentia viridaria*, *Hypsipetes sordidata*, *Melanippe montanata*, *M. fluctuata*, *Melanthia ocellata*, *Thera firmata*, *Campptogramma bilineata*, all plentiful; *Zonosoma punctaria*, *Acidalia imitaria*, *Aspilatis strigillaria*, abundant; *Ortholitha* (*Eubolia*) *palumbaria*, *Oporabia dilutata*, scarce; *Eupithecia minutata*, *E. nanata*, *E. venosata*, *E. tenuiata*, *E. rectangulata*, and other pugs, common.

Botys ruralis and *B. urticata*, plentiful; also *Hydrocampa nymphæata*. *Nemophora swammerdamella*, scarce; *Adela Degeerella* and *A. viridella*, both extremely common in the forest. In the foregoing I have mentioned a lot of common species; perhaps my notes of next season may contain some of the rarer kinds that are to be found in this district. It is impossible to take all the different species in one season, and this being my first here, I am well satisfied with my captures.— J. H. FOWLER; Poulner, Ringwood, January, 1891.

Notes from Plymouth.— This year (1890) larvæ have been far more abundant in this district than imagines, at least this is my experience. Natural attractions in the way of favourite flowers were unproductive until towards the end of the year, when some common species were abundant at ivy bloom. At swallow blossom scarcely anything was taken until the end of March, when *Taniocampa stabilis*, *T. cruda*, and *T. rubricosa*, made their appearance, and were joined early in April by *T. gothica*, which was then more abundant, perhaps, than any of them. As early as the 13th of March, a specimen of *Selenia illunaria* came to light. From the end of February till towards the end of March, *Hybernina leucophearia* was very common in oak woods, accompanied during March by *H. progemma* and *Anisopteryx æscularia*. Out of a number of larvæ and pupæ of *Trochilium bembeciformis* obtained from a willow-bed in April, I only succeeded in rearing one specimen, the rest being attacked by mildew. *Coremia ferrugata* and *Melanippe subtristata* were a perfect pest during May, June, and the early part of July. *Tephrosia crepuscularia* and *T. consonaria*, Newman, were abundant in Bickleigh Vale at the end of May; *Fidonia atomaria* on heathy ground near by. Six larvæ of *Psilura monacha* fell to the beating-stick; this larva seems especially fond of the short weak shoots that so often encircle the trunks of oak trees. Two larvæ of *Pæcilocampa populi*, and three each of *Petasia cassinea* (*Asteroscopus sphinx*) and *Tethea subtusa* were taken about the beginning of June. *Thecla betulæ* larvæ were abundant in some localities not far from here. As before recorded (Entom. xxiii. 264), two specimens of *Heterogenea asella* were beaten on June 20th. I am nearly certain that a third specimen which was secured was the same species, but not knowing the rarity of the species it was discarded, as it had been rubbed in capturing. During July larvæ of *Dianthæcia capsicola* were very abundant, feeding on the seeds of *Lychnis dioica*; *D. carphophaga* and *D. cucubali* rarer on *Silene inflata*. This year I have come across both varieties of the larva of *Trichiura cratægi*. In former years we have found the variety of the larva with golden rings the commoner. This year only one of this variety was beaten, while I obtained a couple of the other. Has it been positively ascertained that these two most dissimilar larvæ are not separate species producing very similar imagines? There seems to be no more reason for classing them as varieties of one species, than for regarding the larvæ of *Acronycta tridens* and *A. psi* as belonging to one species, unless, indeed, the two varieties (?) of the larva of *T. cratægi* have been obtained from the same parent. I beat a larva of *Notodonta dodonea* or *N. chaonia* (am uncertain which until moth emerges) on 21st June, and on 2nd July found a full-fed larva of *Cymatophora ridens* drowned in a stream. This year I reared *Boarmia rhomboidaria* var. *perfumaria* from larvæ taken in the neighbourhood; I believe this variety to be new to the locality. Young *Demas coryli* larvæ were taken as early as Aug. 6th; they seem to

be local, but not uncommon. I obtained fifteen young larvæ by beating, and failing to rear these, I again beat for them about the middle of September. These latter, eleven in number, were nearly all full-grown, and some had taken that beautiful pinkish-yellow tinge which these larvæ usually assume before pupation. I beat *Cleora glabraria* on 7th August, near Bickleigh Vale. Larvæ of *Notodonta dromedarius* were taken at various stages of growth, from Aug. 7th to Sept. 16th. Those taken on the former date were spinning up two days later; the one on the latter date was quite young. Last year I took a larva of this species on *hazel*. *Thecla betulæ* began to emerge on Aug. 10th. On Aug. 12th I beat a fine *Tethea retusa*, and the next day found a full-fed larva of *Notodonta dictæoides*, together with larvæ of *Drepana falcula* and *D. lacertinaria* on birch. *Zygæna filipendulæ* was plentiful on the 18th, in a locality near Plymouth, where we have once taken the variety in which the red colouring is entirely replaced by cream-colour, but we only noticed the type this year. On the 29th of August I took *Tapinostola fulva* in a meadow close here (Reading says it only occurs in two localities in the district, viz., Exeter and Teignmouth). On the 3rd of September I took one larva each of *Thyatira batis* and *Gnophria quadra* (?). The latter died; I could not see that it ate any of the oak lichens with which I supplied it. *Aspilates citraria* was plentiful by Whitsand Bay, near Plymouth, on the 4th; and larvæ of *Bombyx rubi* swarmed. A fine larva of *Acronycta alni* was taken on the 6th, and the next day one of *Stauropus fagi* on quince, both in the immediate vicinity. I beat another *alni* larva on Sept. 11th, near Bickleigh Vale. The first *A. alni* prepared for pupation on Sept. 9th, the second on the 15th, *S. fagi* on the 29th. During the autumn, larvæ of *Notodonta camelina* have been abundant; those of *Hylophila prasinana* not uncommon. Some of the other insects taken this autumn are *Anchocelis rufina*, *A. pistacina*, *Oporina croceago*, *Miselia oxyacanthæ*, *Xylina petrificata* (one), *Xanthia silago*, *X. ferruginea* and *Orthosia lota*; while *O. macilenta*, *Cerastis spadicea*, *C. vaccinii*, and *Phlogophora meticulosa* swarmed at ivy. The latest record is two *Pæcilocampa populi* on Dec. 29th, one of them reared from larva, the other captured at light.—F. J. BRIGGS; Fursdon, Egg Buckland, December 31st, 1890.

Notes from the New Forest.—From the last week in February to the first week in June I found the past season a very favourable one, for the imagines of many species were much more abundant than usual, but the continuous rains after the latter date seem to have caused a great many disappointments in many parts of the country. The New Forest was certainly not an exception, the dearth of many common species being very marked. In July sugar was an absolute failure, and netting at dusk useless. *Argynnis paphia* and *Limenitis sibylla* were not in anything like their usual numbers, while the variety *valesina* was very infrequently encountered. Not one specimen of *Thecla quercus* was observed, although generally a plentiful species, and I failed to sight *Apatura iris* for the first time in five years. *Vanessa polychloros* had not emerged, but three pupæ were discovered. On the heaths *Selidosema ericetaria* (*plumaria*) and *Gnophos obscuraria* were taken sparingly, whilst *Satyrus semele* and *Lycæna ægon* were abundant. An expedition with Mr. H. Robson after *Emydia cribrum* was unsuccessful; either the insect was over, or we were not fortunate enough to strike the right locality. Two specimens of *Hyria auro-raria* turned up, and the males of *Bombyx quercus* were frequently met

with in their wild flight over the heath. It soon became evident that larvæ-beating was the best thing to be done. The oaks yielded *Dasychira pudibunda*, *Amphidasys strataria* (*prodromaria*), *Cidaria siderata*, *Odontopera bidentata*, *Notodonta trepida*, *N. dodonea* (*trimacula*); and from the willows were obtained *Dicranura furcula*, *Pterostoma palpina*, and *Notodonta dromedarius*, but we found it useless to attempt birch-beating. A few larvæ of *Macroglossa fuciformis* were discovered, one of which could not have been hatched more than a few days, while another was about full-fed. Light attracted but few insects, the best thing perhaps being *Aventia flexula*. The extraordinary abundance of *Euchelia jacobæ* is worth recording; these larvæ were in thousands, and every plant of ragwort stripped, large quantities upon the herbage searching for food.—ALFRED T. MITCHELL; 5, Clayton Terrace, Gunnersbury, W., January 24, 1891.

Notes from Invernesshire.—Judging from various notes on the subject, the season of 1890 seems to have been a poor one for Lepidoptera throughout England. I spent August and twenty-four days in September at Beananach, about a mile from Carrbridge, Invernesshire. The neighbourhood was all that could be desired from an entomological point of view, and I was little prepared for the utter lack of Lepidoptera of all kinds, notably Diurni and Noctuæ. There were a good many Geometræ in the pine woods, but almost exclusively confined to the following species:—*Thera firmata*, *T. simulata*, *Cidaria populata*, and *Larentia cæsiata*. Treacling and light (moth-trap) were both failures. Nothing during the day was the sole productive employment.—D. H. S. STEWART; 66, Albert Hall Mansions, W., February 6, 1891.

Notes from Various Localities.—On May 15th my brothers and myself went to Wickham Wood, having been told by a friend that he had found there several larvæ of *Geometra papilionaria*. We searched the whole afternoon and were fortunate enough to get four full-grown larvæ of this insect, three of which attained the perfect state on June 11th, 13th, and 15th, respectively. The fourth turned out to be ichneumonid. On June 9th we visited the same locality, but the only larvæ worth mentioning which we could find were seven *Asphalia flavicornis* on the birches; we took, however, the following insects:—*E. dolobraria*, *B. consortaria*, *E. heparata*, *H. impluviata*, *C. propugnata*, *M. notata* (2). *T. obeliscata* (abundant), *M. montanata*, *V. maculata*, *M. rivata*, *P. petrarum*, *A. remutata*, were all very common, while *E. punctulata* could be seen at rest on almost every tree. From August 2nd to Sept. 6th we were collecting at Sidmouth, in South Devon, and, as in the previous year, netted numbers of *Hesperia actæon*, *Pararge semele*, and *Argynnis paphia*; *A. adippe* and *A. aglaia* were both worn and scarce; *Leucophasia sinapis*, *Lycæna argiolus*, and *Nisoniades tages* were not, as usually, abundant. *Colias edusa* and *C. hyale* were nowhere to be seen (I should like very much to hear from any of your correspondents concerning the appearance of these insects last season). Sugaring during this month was ineffectual, but hedge-beating proved very productive. In this way we captured *C. spinula*, *E. apiciaria* (abundant), *H. elutata*, *U. sambucata*, *C. dotata*, *G. obscurata*, *C. elinguarum*, *A. subsericeata*, *P. cytisaria*, *H. thymiarum*, *C. testata*, *C. ribesaria*, *E. affinitata*, *C. ferrugata*, *C. unidentata*, *C. pusaria*, *M. ocellata*, *M. galiata*, *C. immanata*, *S. illuminaria*, *E. rectangulata*, *C. propugnata*, *C. picata*, *A. plagiata*, *A. promutata*, *M. furuncula*, *C. cubicularis*, *D. capsicola*. In the daytime *B. quercus*, *P. ænea*, and *T. interjecta* were common along the cliffs; and

having found a female of the first-named, we were able thereby to procure as many males as we wanted. On one night, amid drizzling rain, we took on two lamp-posts close to the town *N. popularis* (15), *C. affinis*, *D. diffinis*, *N. plecta*, and *E. fuscantaria*. Among the larvæ which we found at Sidmouth were *Smerinthus populi*, *Sphinx ligustri*, *Dicranura vinula* (extremely abundant, but for the most part ichneumonid), *Brephos parthenias*, and *G. libatrix*. The salallows yielded a plentiful supply of *L. marginata*, *O. bidentata*, and *C. pusaria*. *Saturnia carpinii* and *Bombyx rubi* were very prominent upon the brambles on the heaths, and while collecting a number of these we came across a few *Stilbia anomala*, which were, however, sadly battered. On our return home (Sept. 8th), we tried sugaring till the end of the month, but insects seemed scarce, the only exceptions being *M. maura*, *P. meticulosa*, *X. polyodon*, *M. brassicae*, *T. pronuba*, and *C. nupta*. By light we captured *N. xanthographa*, *C. trapezina*, *E. lucipara* (1), *H. micacea* (3), *N. popularis*, *E. angularia*, *E. tiliaria* (on nearly every lamp), *T. subtusa* (one in a spider's web). Larvæ of *A. betularia*, *O. bidentata*, *M. persicariae*, *M. oleracea*, *H. chenopodii*, *E. lucipara*, *H. triplasia*, *S. menthastri*, *S. lubricipeda*, and *A. aceris* were unusually abundant. We also found one *S. ocellatus* (on an apple tree), and one *D. bifida* (crawling down a poplar trunk).—C. M. WELLS; Hurstfield, The Avenue, Gipsy Hill, S.E.

MELANIPPE FLUCTUATA VAR. NEAPOLISATA, Mill.—In the account of the meeting (November 27th) of the South London Entomological and Natural History Society (Entom. 21), Mr. South is reported to have expressed a doubt as to the occurrence of *Melanippe fluctuata*, L., var. *neapolisata*, Millière, in Britain. In 1886, I sent a number of our dark-banded forms of *M. fluctuata* to Professor C. Blachier, of Geneva, and, as he thought them interesting, he forwarded a few to his friend the late Monsieur Pierre Millière, who at once identified them as exactly the same as his var. *neapolisata*, which he discovered a few years ago in and near Naples, and figured in his 'Iconographe,' vol. iii. pl. 131. In the 'Annales de la Société Entomologique de France,' 1887, Mons. P. Millière describes, and on pl. v. fig. 7 figures, a fine female example of our Aberdeenshire var. *neapolisata*, which was captured by me near Pitcaple in 1886; he at the same time expresses great surprise that a South European form should have been taken in such abundance in North Britain. As a number of specimens have now been found intermediate between the variety and type, several of my entomological friends have expressed a doubt whether the variety is worthy of a distinctive name; but this does not affect the fact that Millière's variety *neapolisata* is not only widely distributed, but common in many parts of Great Britain, especially towards the North of Scotland.—WM. REID; Pitcaple, N.B., January 5, 1891.

SUGAR.—Sugar in this locality, as in others this year, has proved disappointing; the only good thing that appeared during the summer was *Noctua stigmatica*, of which I took nine. From two females I obtained ova, and have now nearly fifty larvæ hybernating; these fed well on chickweed and plantain till the frost came. Though I laid on sugar some weeks nightly, I obtained nothing again of moment till the 3rd week in September; then, as the result of six nights' work, I succeeded in getting a short but very fine series of *Xanthia aurago*, graduating in colour from the deepest orange to pale yellow. The same week I obtained one *Xylina semibrunnea* and one *Epunda lutulenta*; then, with the exception of one

wet Tuesday, when common things were plentiful, the season terminated abruptly.—J. CLARKE; Reading, December, 1890.

LEPIDOPTERA AT LIGHT AT HASTINGS.—From the end of August to the end of October I paid a good deal of attention to the lamps, particularly those on the outskirts of the town, with the result that I took about fifty species of Heterocera, and as I am about the only lepidopterist in Hastings, it may be worth while recording a few of the species taken. This season has been a particularly bad one for Lepidoptera here; many species which usually occur commonly at light, such as *Xanthia flavago*, *Cidaria miata*, &c., I have not seen at all this season, while many others which are generally common only occurred occasionally. The commonest species this season were *Luperina testacea*, *Neuronia popularis* *Diloba cæruleocephala*, *Melanippe fluctuata*, and *Pionea forficalis*. Among those which I found somewhat commonly I may mention *Bryophila perla*, *Hydræcia micacea*, *Ennomos alniaria*, *Acidalia marginepunctata*, *Eupithecia oblongata*, *Anaitis playiata*, *Crambus geniculellus*, *Platyptilia gonodactyla*, &c., while among those which only occurred occasionally or singly were *Lithosia lurideola*, *Hydræcia nictitans*, *Gortyna ochracea*, *Orthosia lota*, *Anchocelis lunosa*, *Drepana binaria*, *Ennomos erosaria*, *Ephyra porata*, *Coremia ferrugata*, *Phibalapteryx vittata*, *Thera variata*, *Cidaria immanata*, *C. testata*, *Eubolia cercinata*, *Chesias spartiata*, *Cataclysta lemnata* (female), *Scoparia angustea*, *Homæosoma binævella*, *Conchylis straminiana*, *Xanthoselia zægana*, &c. The weather has not been at all favourable for working the lamps, as the evenings have very frequently been cold or windy, so that I have had very few really good nights, otherwise the above list would doubtless have been considerably increased.—A. FORD; Alexandra Villa, Braybrooke Road, Hastings.

ABNORMAL PUPATION OF *ACHERONTIA ATROPOS*.—Last autumn I received two larvæ of the above species from Evenlode (Worcestershire), one of which was evidently about to pupate. The morning after arrival I found that the change had taken place, but the pupæ presented a curious spectacle. The larval skin seemed to have been shed successfully, but the wing-cases, instead of being drawn down in the usual way, were fully distended in a globular form and charged with the fluid which the upper part of the abdomen should have retained. It seemed probable that the surface of the pupa would harden in this form, but such was not the case, for but a short period had elapsed before a second inspection, when I found that the wing-cases had burst, discharging their contents. However, they were soon again fully charged and subsequently discharged. This process continued until all the liquid part of the pupa was ejected, leaving little but a shrunken skin. It should be mentioned that the larva had sustained no apparent external injury. Having bred a considerable number of imagines from the larval state without a similar occurrence, I thought this worth recording.—ALFRED T. MITCHELL; 5, Clayton Terrace, Gnnnersbury, W., December 28, 1890.

PALE VARIATION OF LEPIDOPTERA.—Having seen many remarks lately about the dark varieties of Lepidoptera in the London district, I would draw attention to the occurrence of pale varieties also, which, although met with as frequently as the dark ones, do not seem to attract the amount of attention they deserve. The problem to be solved with regard to the cause of pale and dark varieties appears to be equally difficult in both cases. If we

are curious to ascertain the causes of dark varieties, let us also hear the reason of the pale aberrations. — H. SHARP; 23, Union Street, Langham Place, London, W.

PIERIS RAPÆ AND VANESSA URTICÆ IN FEBRUARY.—A small white butterfly was seen flying about some gardens at the north end of the town, on the 13th February, by my brothers, who gave chase, but did not succeed in capturing it. By the description given it would seem to be *Pieris rapæ*. The weather has been somewhat mild during the last week or two, but the night previous to the appearance of the insect was attended with a sharp frost; at about 11 a.m. the atmosphere became very cold, accompanied by rain and snow. While looking over my note-book I came across an entry of a white butterfly that appeared on the 11th Feb., 1890, in the same locality. A specimen of *V. urticæ* flitted about the aforesaid gardens on the 16th of the same month.—J. E. KNIGHTS; North Denes, Great Yarmouth. [One of Mr. McArthur's children saw a white butterfly flying in Fulham on the 12th of February last.—ED.]

NAUSEOUS LARVÆ EATEN BY THE CUCKOO.—Mr. Newstead's note in the January number of the 'Entomologist,' about the cuckoo, is specially interesting, as showing that it is an exception to the rule which the late Mr. Darwin considered to be established by Mr. Jenner Weir's experiments, that birds would not eat brightly coloured and nauseous larvæ. This propensity of the cuckoo probably accounts for the comparative scarcity of the larvæ of *A. grossulariata*, *D. cæruleocephala*, and *C. verbasci* in this neighbourhood, which has been frequently noticed, for we have an unusual quantity of cuckoos. It would be interesting to know whether the cuckoo will also feed upon the larva of *Mania typica*, the inedible exception of the protectively-coloured larvæ.—J. C. MOBERLY; Woodlands, Bassett, Southampton, Jan. 17.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON. — February 4th, 1891. Mr. Frederick DuCane Godman, M.A., F.R.S., President, in the chair. The President nominated the Rt. Hon. Lord Walsingham, M.A., F.R.S., Professor Raphael Meldola, F.R.S., and Dr. David Sharp, F.R.S., Vice-Presidents for the Session 1891—92. Dr. Thomas A. Chapman, M.D., of "Firbank," Hereford; Mr. Horace St. John Donisthorpe, of 37, Courtfield Gardens, S.W.; Mr. F. W. Frohawk, of 9, Dornton Road, Balham, S.E.; Mr. E. Ernest Green, of 10, Observatory Gardens, W.; Mr. G. F. Hampson, B.A., of Thurnham Court, Maidstone; Mr. Frederick J. Hanbury, F.L.S., of 69, Clapton Common, Upper Clapton, N.E.; and the Hon. Mary Cordelia E. Leigh, of Stoneleigh Abbey, Kenilworth, were elected Fellows of the Society. Mr. C. J. Gahan called attention to a larva which he had exhibited at the meeting of the Society on the 1st October last, when some doubt was expressed as to its affinities. He said that Prof. Riley and Dr. Packard had since suggested that the larva was that of a dipterous insect of the family *Blepharoceridæ*; he was quite of the same opinion, and thought it might probably be referred to *Hammatorrhina bella*, Löw, a species from Ceylon. Mr. Tutt exhibited a long series of *Agrotis pyrophila*, taken last year by Mr. Reid, near Pitcaple, in Aberdeenshire, and remarked that this species had been commoner than usual last year in Scotland, the Isle of Portland, and the Isle of Man. He also exhibited

long and variable series of *Melitæa aurinia* (*artemis*), *Triphæna orbona*, *Abraxas grossulariata*, and *Melanippe fluctuata*, all from the same locality in Aberdeenshire. The Rev. Canon Fowler exhibited a cocoon of *Deiopeia pulchella*, recently received from Lower Burmah. Mr. C. O. Waterhouse exhibited specimens of *Scyphophorus interstitialis*, a Mexican species, and *Aceraius comptoni*, a Ceylonese species, recently taken by Mr. Bowring in his greenhouse. He also exhibited, on behalf of Miss Emily M. Sharpe, a specimen of *Daphnis hypothous*, Cramer, a native of Borneo, Java, and Ceylon, caught some years ago at Crieff, N.B. The specimen had long been confused with *Chærocampa nerii*, under which name its capture was recorded in the 'Entomologist,' xiii. p. 162 (1880). The Rev. Dr. Walker exhibited a collection including many species of Orthoptera and Scorpions recently received from Jerusalem. Mr. Frederick Enock read an interesting paper entitled "The Life-history of the Hessian Fly." This paper was illustrated, by means of the oxy-hydrogen lantern, with a number of photographs of original drawings showing the fly in all its stages and transformations. Mr. G. H. Verrall said he believed the Hessian Fly was no more a recent introduction into this country than the Cabbage White Butterflies. The discussion was continued by Mr. Godman, Mr. Enock, and others. Mr. Roland Trimen communicated a paper entitled "On some recent Additions to the List of South African Butterflies." Mr. H. W. Bates communicated a paper entitled "Additions to the Carabideous Fauna of Mexico, with remarks on species previously recorded." Mr. W. F. Kirby read a paper entitled "Notes on the genus *Xanthospilopteryx*, Wallgr. Dr. D. Sharp contributed a paper entitled "On the Rhynchophorous Coleoptera of Japan," Pt. 2.—H. Goss & W. W. FOWLER, *Hon. Secretaries*.

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—*December 15th*, 1890.—Mr. W. G. Blatch, President, in the chair. Mr. H. J. Sands Harborne was elected a member of the Society. Mr. R. C. Bradley showed *Emmelesia albulata*, type, from Knowle, and var. *thules* from the Shetlands. Mr. W. G. Blatch showed *Mycetophorus punctus* and *Conurus immaculatus* from Knowle, two beetles new to the Midlands. Mr. G. T. Baker read a paper on the Butterflies of Sunderland, giving a list of species to be obtained there, and exhibiting many of the most interesting.

January 5th, 1891.—Mr. W. G. Blatch, President, in the chair. Mr. P. W. Abbott showed *Noctua glareosa* and *Eubolia cervinaria* from Sutton Coldfield. Mr. R. C. Bradley showed *Sciara thomæ* from Cannock Chase. Mr. W. G. Blatch read a paper on the Coleoptera he had collected, during 1890, in the Church Stretton district; he showed ninety species, all of which were rare and interesting.

January 19th.—On this date the first annual *Conversazione* of the Society was held in the Library Hall at the Medical Institute. Over one hundred friends were present, and an instructive and pleasant evening was spent. Among the exhibits may be mentioned the following:—Collection of Midland Coleoptera in ten drawers, by Mr. W. G. Blatch; also Hemiptera-Heteroptera and Hymenoptera-Aculeata, by Mr. Blatch. Collection of British Butterflies, by the Rev. C. F. Thornehill; ten drawers of Hemiptera-Homoptera, by Dr. P. B. Mason; seven drawers of South American butterflies, by Mr. G. H. Kenrick; ten drawers of exotic butterflies, by Mr. G. T. Baker; ten Lepidoptera and others, by the Rev. E. J. Nurse; collection of Tipulidæ in seven boxes, by Mr. R. C. Bradley; and

other exhibits by Messrs. G. W. Wynn, E. C. Tye, A. H. Martineau, P. W. Abbott, J. W. Neville, and C. J. Wainwright.

February 2nd.—Annual Meeting.—Mr. W. C. Blatch, President, in the chair. The Secretary read the Annual Report, which showed the Society to be in a satisfactory position. The Treasurer presented his Financial Statement, showing a slight balance in hand. Votes of thanks were passed to the officers for their services during the past year, and the following were elected for the ensuing year:—President, Mr. W. C. Blatch; Vice-President, the Rev. C. F. Thornewill; Treasurer, Mr. R. C. Bradley; Secretary, Mr. Colbran J. Wainwright; Librarian, Mr. A. Johnson; Auditors, Mr. H. Stone and Mr. A. S. Wainwright. Messrs. P. W. Abbott and A. H. Martineau were elected as remaining members of the Council.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

[The Secretary will be glad to hear from any entomologists in the Midlands, not now members of the Society. The Society meets on the first and third Monday in each month, at 8 p.m., at the Medical Institute, Edmund Street, Birmingham.]

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.
—*January 22nd, 1891.* W. H. Tugwell, Vice-President, in the chair. Mr. J. C. Dacie, of Putney, was elected a member. Mr. South exhibited specimens of what he thought to be a new species of *Miana*, the examples which had been until lately in his cabinet as *M. strigilis*, Clerck., were taken with others in North Devon. Mr. South read notes relative to his exhibit. Mr. Tugwell remarked that an examination of a larger number of specimens would be necessary before coming to any conclusion as to whether those now shown were a new species or only strongly divergent forms of *M. strigilis*. Mr. J. A. Clark, a variety of *Arctia caia*, L., in which almost all the white of the superior wings was replaced by brown colour. Mr. Short, specimens of *Polyommatus phlæas*, L., approaching the variety *schmidtii*, Gerh. Mr. Tugwell, *Hepialus velleda*, Hb., from Paisley, showing considerable variation in colour and size. It was mentioned that this species occurred at Darenth Wood and Folkestone, Kent; and at Sutton and Box Hill, Surrey. Mr. Tutt, specimens of *Miana* received from Ireland, which he contended were intermediate between *M. strigilis* and *M. fasciuncula*, and remarked that he and Mr. Atmore had that afternoon examined his series, consisting of one hundred and seventy of the one species and eighty of the other; and that they had been unable to find a single typical point of difference between the two, either in the stigma or the transverse lines; and as to the dorsal tufts, these were common to both species. In the discussion that followed, Messrs. South, Tugwell, Adkin, Fenn, Hall, and others took part. Mr. Billups exhibited *Sericomyia borealis*, Ten., and the rarer species *S. lappona*, L., *Chilosia æstræa*, L., *Arctophila nussitans*, F., *Eristalis utricarius*, L., and *Volucella bombylans*, L., with very dark varieties of the same, all taken in Aberdeenshire last season. A communication from the President was read by the Secretary. The Treasurer submitted his balance-sheet, showing a balance to the Society's credit of £71 17s. 9d. The Secretary read the Council's report for 1890, from which it appeared that 32 members had been elected during the year, making a total membership of 232. The election of officers was next proceeded with, and resulted as follows:—Mr. W. H. Tugwell, President; Mr. J. Jenner Weir, F.L.S.,

&c., Vice-President; Mr. E. Step, Hon. Treasurer; Mr. W. West, Hon. Curator; Mr. D. J. Rice, Hon. Librarian; Mr. H. W. Barker and Mr. D. J. Rice, Hon. Secretaries; Messrs. R. Adkin, F.E.S., T. R. Billups, F.E.S., C. A. Briggs, F.E.S., J. T. Carrington, F.L.S., C. Fenn, F.E.S., R. South, F.E.S., and J. W. Tutt, F.E.S., Council. The meeting closed with votes of thanks to the various officers.

February 12th, 1891. — W. H. Tugwell, President, in the chair. Mr. R. Adkin exhibited *Aplecta occulta*, L., bred during November and December last from ova received from Forres in the previous August. The specimens were all of a light form, the pink shade in the primaries being strongly produced in many of them. Mr. Tugwell said there was a darker shade of colour in the specimens shown than those obtained in the south. Mr. Tugwell exhibited *Melanippe hastata*, L., from Sussex and the Shetlands, to show the desirability of obtaining insects from various localities. Mr. Nussey, bred specimens of *Thecla pruni*, L., and called attention to a large specimen of the female which had emerged from the pupa without antennæ. Mr. W. H. McLachlan, *Polii chi*, L., dark forms of *Noctua xanthographa*, Fb., *Agrotis lucerneæ*, L., and *Epunda nigra*, Haw., all taken at Aberdeen. Mr. Farrant, a richly coloured specimen of *Smerinthus tiliæ*, L., and an example of *Epinephelæ hyperanthæ*, L., approaching var. *arete*, Müll. Mr. Auld, a coloured drawing of a pale variety of *Abraxas grossulariata*, L. Mr. Billups, *Trogus novæ-caledonicæ*, Moutronze, *Enicodes fichtelii*, Schr., and Cicindelidæ, *Caledonica lanegera*, Chan., and stated that the three species seemed to be exclusively confined to New Caledonia; also two species of Hemiptera from the same locality, *Tectocoris banksii*, Don., and *Myctis symbolica*, Don.; and remarked that, unlike the Coleoptera, these two species had a very wide range, the former having been taken in Java, Australia, Timor, the Celebes, and Tonga, while the latter, in addition to the above-mentioned places, had also been met with in the New Hebrides and Ceram; also a number of miniature Mollusca obtained from drift collected by Mr. C. G. Barrett on the Pembrokeshire coast, and read note relative thereto.—H. W. BARKER, Hon. Sec.

REVIEWS.

The Lepidoptera of Suffolk. Compiled by E. N. BLOOMFIELD, M.A., F.E.S.
London: W. Wesley & Son. Colchester: W. H. Harwood, 1890.

THIS very useful annotated local list of Lepidoptera will be welcomed by entomologists generally, but especially perhaps by those who are interested in the distribution of Lepidoptera in this country.

The Honey Bee: its Natural History, Anatomy, and Physiology. By T. W. COWAN, F.L.S., &c. London: Houlston & Sons. Fcp. 8vo. 200 pp. 1890.

THERE are many excellent works on the Honey Bee, but it has been reserved for the author of the present little book to produce a work which will probably prove as indispensable to the student as it certainly will be useful to everyone who is interested in Hive Bees. Although treated in a concise manner, all phases of the subject are thoroughly dealt with. Numerous well-executed illustrations, and a list of 172 works consulted and referred to in the text, add considerably to the value of the book.

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[No. 335.

ON THE DISTRIBUTION IN EASTERN ASIA OF CERTAIN SPECIES OF LEPIDOPTERA OCCURRING IN BRITAIN.

BY RICHARD SOUTH.

In drawing up the accompanying table of distribution I am indebted for much of my information to the following papers, and I would refer the reader to these if he desires further acquaintance with the subject:—

“On the Butterflies of Amurland, North China, and Japan.” By H. J. Elwes (Proc. Zool. Soc. 1881).

“On Butterflies from Japan.” By A. G. Butler (Proc. Zool. Soc. 1881).

“Catalogue of the Lepidoptera of Japan.” By H. Pryer (Trans. Asiatic Soc. of Japan, vols. xi. xii.).

“On the Lepidoptera of Japan and Corea.” By J. H. Leech (Proc. Zool. Soc. 1887, 1888, and 1889).

“A Catalogue of the Lepidoptera of Sikkim.” By H. J. Elwes (Trans. Ent. Soc. 1888).

“On a Collection of Lepidoptera from Kiukiang.” By J. H. Leech (Trans. Ent. Soc. 1889.)

TABLE SHOWING THE DISTRIBUTION IN EASTERN ASIA OF SOME BRITISH SPECIES OF RHOPALOCERA.

	Amur.	N.W. India.	China.	Corea.	Japan.
PAPILIONIDÆ					
Papilio machaon	+	+	+	+	+
PIERIDÆ					
Aporia cratægi	+		+		+
Pieris brassicæ	+	+			
„ rapæ	+		+	+	+
„ napi	+	+	+	+	+
„ daplidice		+	+	+	
Euchloë cardamines	+		+		
Leucophasia sinapis	+			+	+

	Amur.	N.W. India.	China.	Corea.	Japan.
<i>Rhodocera rhamnii</i>	+	+	+	+	+
<i>Colias hyale</i>	+	+	+	+	+
NYMPHALIDÆ					
<i>Argynnis selene</i>	+				
" <i>latona</i>	+	+	+		
" <i>aglaia</i>	+	+		+	+
" <i>adippe</i>	+	+	+	+	+
" <i>paphia</i>	+		+	+	+
<i>Melitæa aurinia</i>	+			+	
" <i>athalia</i>	+			+	+
<i>Vanessa c-album</i>	+	+	+	+	+
" <i>urticæ</i>	+	+	+		+
" <i>io</i>	+			+	+
" <i>antiopa</i>	+	+	+		+
" <i>cardui</i>	+	+	+	+	+
<i>Limenitis sibylla</i>	+			+	+
APATURIDÆ					
<i>Apatura iris</i>	+		+		
SATYRIDÆ					
<i>Satyrus semele</i>		+			
<i>Epinephele hyperanthes</i>	+			+	+
LYCENIDÆ					
<i>Thecla w-album</i>	+		+		
" <i>pruni</i>	+				
" <i>rubi</i>	+				+
<i>Polyommatus phloas</i>	+		+	+	+
<i>Lycæna boetica</i>		+	+		+
" <i>argiades</i>	+		+	+	+
" <i>ægon</i>	+			+	+
" <i>astrarche</i>	+	+			
" <i>icarus</i>	+	+			
" <i>argiolus</i>	+		+	+	+
" <i>semiargus</i>	+				
" <i>minima</i>	+				
" <i>arion</i>	+				
HESPERIDÆ					
<i>Syrichthus malvæ</i>	+				
<i>Nisoniades tages</i>	+				
<i>Hesperia lineola</i>	+				
" <i>sylvanus</i>	+		+	+	+
" <i>comma</i>	+				+
<i>Carterocephalus palæmon</i>	+				

PAPILIO MACHAON, Linn.—Mr. Elwes says:—"The forms of *P. machaon* found in N.E. Asia seem to be similar to the European ones, though usually larger. In Kamtschatka, according to Ménétris, the variety which he calls *asiatica* differs generally in the broader black band and markings, which, however, vary extremely, and gradually increase until in the var. *hippocrates* (which I have only seen from China and Japan) the yellow is half obliterated by the black markings."

There are several broods in each year, the first batch of imagines appearing in March and April. From ova deposited by a typical female captured at Nagasaki, Japan, in the last-named month, Mr. Leech bred, in the following June, a fine series of vars. *asiatica* and *hippocrates*; "some specimens had the usual proportion of black and yellow, others were of a much deeper yellow than the ordinary type, and some were nearly all

black, being by far the most pronounced var. *hippocrates* I have yet seen. Every specimen was much larger than the parent."

An almost tail-less form occurs in Kashmir.

PIERIS BRASSICÆ, Linn.—So far this species does not seem to have been received from either China or Japan. The Indian examples do not differ materially from European specimens, except that those taken at high elevations (11,000—17,000 ft.) are smaller.

PIERIS RAPÆ, Linn.—Common in Japan, Corea, and N. China, where it is often abundant in market gardens and on other cultivated ground, as in England. A local form of this species, known as *crucivora*, has the fore wings of the female thickly sprinkled with grey-brown scales, especially at the base; in the male the second spot of the under side of the fore wing is reproduced more or less distinctly on the upper surface. This form has been considered as a local race of *P. brassicæ*, but Mr. Leech has shown that it is connected by intermediate forms with typical *P. rapæ*, which also occur in the same localities; and he adds:—"Mr. H. Pryer informs me that the larvæ, which feed on the cultivated *Cruciferae*, do not differ from the typical forms, nor does the pupa."

PIERIS NAPI, Linn.—Extremely variable: occurs all over Japan and Corea, and has been received by Mr. Leech from several localities in N.W. China. Although typical *napi* are by no means uncommon, most of the specimens from East Asia are of the form *melete*, Mén. Mr. Leech says of it:—"In Central and Northern Japan *napi* seems to be the spring form, and there are specimens in Mr. Fenton's collection in no way separable from British examples, and I have all the intermediate forms between *napi* and *melete* in my own collection. In Southern Japan the larger and darker forms predominate, and there is less difference between the broods." Besides other named forms of this species occurring in East Asia is one analogous to *bryoniæ* from Europe; this has been named *aglaope* by Motschler, who obtained specimens from Japan.

RHODOCERA RHAMNI.—Various forms (?) of this species are found in East Asia, and these are referred to by Mr. Elwes as follows:—"The European form *R. rhamni* was found in the Burisja Mountains by Radde, and, according to Bremer, at Pekin. The form called *R. aspasia* occurs in various parts of the Amur region, and is usually known by its rather smaller size and paler colour, and, according to Ménétrîés, may be certainly distinguished by the shape and venation of the wings, though I am unable to follow the distinctions he draws in the specimens before me. The Japanese form is like the one described by

Felder as *R. acuminata*, which he says differs in its larger size, brighter colour, more distinct discal spots, and in having the apex of the fore wing more produced. Chinese specimens, in Dr. Staudinger's collection, are more like *R. aspasia*; and Bremer states that a Chinese specimen he examined agrees with *R. rhamni*; so that the differences are evidently not constant. The Himalayan form, distinguished as *R. nipalensis*, is known by its bright colour, and by the wings having the marginal spots more conspicuous than usual in *R. rhamni*, which, however, it resembles more in colour and shape than it does *R. aspasia*."

R. maxima, Butl., is a large deeper-coloured insect from China.

Mr. Leech, in his remarks on *R. rhamni*, says:—"Occurs all over Japan and Corea. The *rhamni* (*maxima*) form occurs at low elevations in Central Japan. I only took *acuminata* on the mountains; from Gensan I have a specimen of true *rhamni*, and I have received from Ningpo two specimens which resemble *acuminata* in the shape of the wing, and *rhamni* var. *farinosa* in colour. There can be little doubt that these refer to one species, but I can form no opinion with any certainty until I receive larger series."

COLIAS HYALE. — Several forms of this species have been named and described as distinct. Concerning some of these so-called species, Mr. Leech gives his observations whilst at Nagahama:—"I found," he says, "the forms described as *poliographus*, *simoda*, *subaurata*, and *elwesii* all together; and of six pairs which I took *in copulâ*, and kept separately labelled, only two pairs were of the same form, viz., *simoda*; the remainder were as follows:—Two cases of *simoda* ♂ and *elwesii* ♀; one case of *subaurata* ♂ and *elwesii* ♀; one case of *simoda* ♂ and *poliographus* ♀. The inference is that they belong to the same species."

ARGYNNIS ADIPPE, Linn.—A very variable species. The forms known as *chlorodippe*, *cleodoxa*, and *cleodippe* occur, and three other varieties from Japan and China have been considered distinct, and named respectively *pallesceus*, *vorax*, and *locuples*.

ARGYNNIS PAPHIA, Linn.—The Japanese form described as *paphiodes* by Mr. Butler is rather larger and darker than European *paphia*, but it cannot be considered specifically distinct. Mr. Leech says that female specimens from Japan and Corea are intermediate between typical *paphia* and var. *valesina*, and that the specimens from Kiukiang, China, are rather larger than those from Europe, the females being all of the *valesina* form; but some are darker than others. Both forms of the female occur at Chang-Yang, Central China.

MELITÆA AURINIA, Rott.—According to Mr. Leech, the Korean specimens are larger and paler than European examples. Mr. Elwes says that the species is rare in Amurland.

MELITÆA ATHALIA, Rott.—Mr. Elwes writes :—"The forms of *M. athalia*, found in Eastern Asia, are somewhat different from the European ones; but the Japanese *M. nippona* is like those from Askold. The variety *orientalis* from the Ussuri differs, in the female sex, in having whitish instead of yellowish spots beneath." The Korean specimens are stated, by Mr. Leech, to be usually paler than Japanese, but he adds :—"This species is so variable that it is impossible to form a correct opinion concerning it, without longer series than at present exist in this country."

VANESSA URTICÆ, Linn.—This species appears to be represented in Eastern Asia by certain local forms, some of which are more distinctly characterised than others. The Japanese *V. connexa*, Butl. (*vide* fig., Entom. xxii. pl. viii. fig. 3), is a very handsome form. Mr. Leech met with it about half-way up the volcano near Hakodate, and he is inclined to believe that it does not occur in any other part of Japan. The Kaschmir form is usually larger than the type, and the colour is duller in tone and more suffused. From N. W. China, Mr. Leech has a very large form, which is exceedingly bright in coloration, and the usual yellow spots on the costa of fore wing are suffused with tawny.

APATURA IRIS, Linn.—This species appears to be very common in some parts of China. In Thibet a brown form occurs, to which M. Oberthür has given the varietal name of *bieti*.

POLYOMMATUS PHLÆAS, Linn.—The late Mr. Henry Pryer, writing of this species, says that in Japan it is very susceptible to temperature, and is subject to great variation in the matter of size, colour, and markings. He adds :—"I have specimens measuring from 1 to 1½ inch. Some specimens are almost black, others are very light, and some have a row of blue spots on the hind wing. I have taken the dark forms in Boshu, and the light ones about Yokohama, both in the month of November. As a general rule, with this and many other species, the hotter the weather the darker and larger the specimens; and Boshu is decidedly warmer than Yokohama."

A dark form of the species known as *timeus*, Cram., is of common occurrence throughout Eastern Asia, and is very similar, if not exactly identical, with the form with which British entomologists are familiar as var. *eleus*, Fab. The other forms, some of which have been described as species, are also represented in Europe.

LYCÆNA BÆTICA, Linn.—A common species in many parts of India, China, and Japan. It varies in size and in depth of colour.

LYCÆNA ASTRARCHE.—Does not exhibit any material difference from European examples.

The Heterocera will be considered in a future paper.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

BY F. H. PERRY COSTE, F.C.S., F.L.S.

(Continued from p. 60.)

V.—THE CHEMICAL ASPECT (*continued*).

G.

IN this subsection we have to consider the case of chestnut, a colour sufficiently interesting,* but one which need not detain us for an unduly long time.

My readers are already familiar with the broad facts as to this colour, *viz.*, that it is a close analogue of yellow, and, like it, has been developed on or in, but *not from*, white wings, and also in one or two cases in wings of another "colour" than white; that it also, like yellow, belongs to the class of soluble, as distinguished from alterable, pigments; and that in exceptional cases it may also—as yellow so frequently does—develop *into a red*. Furthermore, we are able to distinguish with chestnut, as with yellow, progressive stages in stability (insolubility); and, as apparently a yet closer analogy, we find it possible that the chestnut pigment may advance to a very high stage of *brilliancy*, while yet remaining in the primeval stage as to solubility. This fact is exemplified by *V. urticæ*, and *Polyommatus phlœas* and *virgaurea*—instances that may, perhaps, be compared with *E. cardamines* among the yellows. And, in saying this, I should like to take the opportunity of clearing up a passage that I fear is reprehensibly ambiguous, and very liable to misinterpretation, in the foregoing subsection. In classifying the yellows (Entom. xxiv. p. 9), I divided them into three classes, according to their solubility or otherwise, and I placed *E. cardamines* in the first class, as possessing a very soluble pigment. So far, this is all right; but I fear that my subsequent remarks may very well be interpreted as implying that *E. cardamines* represented the *initial* stage of colouring—a stage beyond which the yellow species in classes 2 and 3 have considerably advanced. Now, seeing that *cardamines* is far more brilliantly coloured than many of the species in these two later classes, such a statement must seem very incongruous. But I ought to have more strongly emphasised the fact that while in so many yellow species an advance in depth of colour seems to go *pari passu* with a decreasing solubility,—this being the contention that my

* And the more so since—to quote Wallace—"reddish or yellowish brown is, perhaps, the commonest colour among butterflies" ('Tropical Nature,' p. 190).

remarks in part of the last subsection were intended especially to enforce,—yet in certain instances, as in *cardamines*, a remarkable brilliancy of colour has been attained *without* any decrease in solubility.* But it should be noted, as of especial interest, that this *cardamines* colour is, as it were, developed in a collateral line, and *not* in the direct line of ascent to the *stable* oranges and yellows.† I merely note this now, since it will be necessary to recur to the subject.

Furthermore, it is necessary for me to retract my remarks on *brown*, as being distinct from chestnut. It will be remembered that I designated as chestnut all those brownish species that proved amenable to my reagents, and separated off as a distinct class, under the name of brown, all those that were unaffected. But I have since concluded that this is hardly justifiable; at any rate, it is both illogical and inconsistent, so long as we recognise among the analogous yellows three stages, of which one is perfectly indifferent to all my reagents. Whatever mode of treatment we adopt in dealing with yellow, we must adopt the same with regard to chestnut; and, accordingly, I now propose to restore the eliminated brown species to the class of chestnuts, recognising in chestnut several different stages exactly as in yellow. And, in fact, so closely similar is the behaviour of chestnut to that of yellow, that a very large portion of the remarks made on yellow‡ are almost equally applicable, *mutatis mutandis*, to this colour. I shall, therefore, to avoid needless repetition, refer the reader back to subsection F for the bearing of the phenomena of chestnut on natural selection and coloric evolution.

The main headings, to which I wish to direct attention in this present subsection, are the following:—

1.—That in chestnut, as in yellow, there is reason to suppose that the pigment has been developed *on* an—usually white—wing; that this pigment was at first of a very soluble nature, but in process of time becomes increasingly stable. That we may

* An exactly parallel case is found in the *Delias* species, already referred to. See also following footnote.

† Since the preceding subsection (F)—on yellow and red—was written, I have been a good deal exercised in my mind about these species of *Euchloë*. At one time it appeared to me that I had been wrong in assuming that *cardamines* orange had been developed *viâ* pale yellow at all, and that rather it was a distinct and independent development altogether. This view would, of course, entirely evade the necessity of supposing that a yellow had progressed into so brilliant an orange, while still remaining so soluble; and I was inclined further to support this by arguing from the chestnut species, such as *L. phloxæ*, &c. But further reflection and experiment have resulted in bringing me back to my original views. For, on examining the species *E. eupheno* (with its orange tips—identical with those of *cardamines*—on a brimstone-yellow background), I feel almost convinced that the orange here is a development from the yellow. Unfortunately, I have been unsuccessful in my attempts to obtain specimens for experiment; but, in the very analogous *Gonopteryx cleopatra*, I find that the orange is rapidly converted into the ground colour of yellow, and then the *whole* yellow dissolves, leaving a *whitish* wing. This is exactly analogous to *Delias*.

‡ *Antea*, pp. 11, 12, 13.

thus distinguish several (say three) different stages or planes in chestnut also, and that in the highest (most stable), it is at present not possible to determine certainly whether we are dealing with a "physical," or with a very stable, pigment colour. And, finally, that in chestnut, also, a very marked advance in brilliancy of colour may take place without a concomitant increase in stability (*i. e.*, decrease in solubility). This latter, as already stated, I consider to be of the nature of a *collateral advance*, not a stage in the main-stream of coloric evolution.

2.—That chestnut, as well as yellow, may evolve into a *red*.

On the other hand, several differences must be noted:—

1. That the concomitance of increased brilliancy, or depth of colour with increased stability (insolubility), is *by no means so clear* (if, indeed, it can be legitimately maintained at all) in chestnut as in yellow; and, on the other hand, the "collateral" brilliant, but soluble, colours appear far more common in chestnut than in yellow.

2.—That the advance to red, which is so common among yellows, is very rare among chestnuts; though *why* this should be so—considering, especially, how brilliant a colour has been evolved in the case of *atalanta*—is by no means clear.

Let us now arrange the various chestnut* species in three divisions, corresponding with those of yellow:—

3. Unaffected.	2. Intermediate; somewhat affected.	1 A. Brilliant; but soluble easily.	1. Soluble easily.
<i>Orgyia antiqua</i> <i>Bombyx quercus</i> <i>Orthosia macilenta</i> <i>Mamestra oleracea</i> <i>Cidaria suffumata</i> <i>Coremia ferrugata</i> <i>C. munitata</i> <i>Rumia crataegata</i> <i>Phalera bucephala</i> and perhaps <i>Limenitis sibylla</i>	<i>Melitæa athalia</i> <i>Epinephela tithonus</i> <i>Satyrus megæra</i> <i>Athyma penus</i> and perhaps <i>E. ianira</i>	<i>Vanessa io</i> <i>V. antiopa</i> <i>V. urtica</i> <i>Polyommatus</i> <i>phlæas</i> <i>P. virgaurea</i>	<i>Vanessa cardui</i> <i>Argynnis paphia</i> <i>A. selene</i> <i>Cænonympha</i> <i>pamphilus</i> <i>Hesperia sylvanus</i> <i>Danaïs chrysippus</i> <i>D. hegesippus</i>
		†	†

Several interesting points are brought out by this tabulation. First of all, it is to be noted that, with one doubtful exception, *no Rhopalocera* are to be found in No. 3 column, and no *Heterocera* in the others. Whether this distinction will hold good when larger numbers of species come to be examined, it is, of course, as yet, impossible to say. And in this connection we must note, also, another point, *viz.*, that among the yellows several of the species placed in the "unaffected" column were known (by other reactions or by their relationships) to be certainly *pigmented*

* See Entom. xxiii. pp. 221 and 250.

† Note that alkalis seem considerably more efficacious, on the whole, than acids in dissolving chestnut. See Entom. xxiii., p. 250.

species; but, unfortunately, we have no such clue to the chestnut species in column 3, and, in fact, are entirely in the dark about them. It is unnecessary to add any details here about these "unaffected" chestnut species, since such have already been given.*

In the next place, this tabular arrangement emphasises the remark made, in a previous paragraph, that among the chestnuts increasing stability by no means connoted increased brilliancy, for the species in column 2 can scarcely be considered more brilliant or deep coloured than those in column 1.

The species noted in column 2 call for no individual remark, and we may, therefore, pass on to briefly consider those in column 1 A. The two species, *P. phlœas* and *P. virgaurea*, appear to me to be the most exact analogues of *E. cardamines*, since in both cases, alike, the pigment has acquired an intense brilliancy, and in both it is completely soluble, leaving a pure white wing; and just as this behaviour of *cardamines* may be compared with the reaction of the similarly soluble pale yellow of, e.g., species of *Terias*, so, too, we may compare the behaviour of *P. phlœas* and *P. virgaurea* with that of the pale brown displayed by *Cænonympha pamphilus*—a brown that is equally soluble, and equally leaves a pure white wing. The point which I wish to make in drawing this comparison is that, just as we may consider that a pale yellow developed into the brilliant orange of *cardamines*, without any loss of solubility, so also a pale soluble brown, such as that of *C. pamphilus*, was the precursor of the brilliant colour of *P. virgaurea*.

Turn we now to the species of *Vanessa*, which form a specially interesting and important group. First, as to *V. urticæ*: this is a very important species, as forming a (coloric) link between so many other species. The chestnut colour of *V. urticæ* is readily soluble, and can be seen oozing out and rising in dark vortices in the solvent.† Now exactly the same result is observed in *V. antiopa* and *io*. There can be no possible doubt that the same pigment is present in all these three species. But—and here we come to a very interesting point—whereas, in *urticæ*, a white is produced, in the other two species we find black. This puzzled me a good deal in the early days of my experiments, but the explanation, of course, is really very simple; indeed, it was the study of these species that first taught me that chestnut (and by inference, yellow‡) is not evolved from, but on or in, white; that its origin is, therefore, genetically independent of white. This obviously clears up the whole matter at once. The reason why the wings of *io* and *antiopa* "are transformed from chestnut to black" by my reagents,

* Entom. xxiii. p. 221.

† I can recommend this as a singularly pretty experiment to any who are interested in observing such things.

‡ I have, as yet, met with no yellow similarly evolved on a black wing; but I live in hope.

is simply that the ground colour of the wings is black, on which ground colour the chestnut has been evolved by the same processes which produced a similar chestnut on the whitish wing of *urticæ*.

In another respect, also, I consider *urticæ* an important link, for the colour—in superficial appearance—is, as it were, intermediate between such dull colours as those of *S. megæra*, &c., on the one hand, and the brilliant copper of the *Lycænidæ*, on the other. Some hesitation might be felt in classing together such, apparently, very different colours as those of *P. virgaurea*, *S. megæra*, or *C. pamphilus*; but very little violence to our prejudices is done by classing together such colours as those of *virgaurea* and *urticæ*; and from *urticæ* we have coloric transitions, by easy stages, through *Argynnis*, *Melitæa*, and *Epinephele*, down to the palest and dullest of colours. Moreover, the contrast of *virgaurea* and *pamphilus* is no more than that of *cardamines* or *C. edusa* and *Abraaxas grossulariata*, or the species of *Terias*.

The remaining species (column 1) call, I think, for no further remark at present. I will merely add that the species of *Danaïs* are so richly endowed with the chestnut pigment, that one hour is insufficient time for the total solution thereof.

Now, as to the evolution of red from chestnut. My readers are already pretty well aware of the grounds for holding that *atalanta* red has not been evolved—as almost all other reds—from yellow, but is descended from the chestnut of *cardui*. The proofs are, I think, very conclusive; indeed, we have a concursus of both entomological and chemical evidence.

The red does not—like all other reds—instantly turn yellow, but becomes of a “*cardui*-brown”; there is no reversion; but the pigment dissolves, just as does the chestnut of the other *Vanessa* species. Moreover, from the entomological side, *atalanta* and *cardui* are exceedingly closely allied—as the most cursory inspection will show; there is an intermediate Asiatic species, *V. indica*, marked like *atalanta*, but with the scarlet band replaced by one of *cardui*-brown; and, lastly, in *cardui* itself we find a delicate pink colour developed on the under surface. It seems to me, therefore, very clear that *atalanta*-red is a derivative of chestnut, and in this fact we have—as already pointed out—a very strong proof of the intimate relationship in constitution between the two pigments, chestnut and yellow. But why so conspicuous and presumably serviceable colour as red, which is so constantly developed by yellow species, has been so rarely developed by the far more numerous chestnuts, is a puzzling problem that I must confess myself totally unable to even conjecturally solve.* Some-

* One experiment with *atalanta* has not yet been recorded. I treated several wings with a strong solution of silver nitrate. The effect was to change the red of *atalanta* into a very deep chocolate. It was this that induced me to experiment on so many species—but unsuccessfully—with a (probably weaker) solution of this reagent. See Entom. xxiii. p. 185.

thing comparable with the reaction of *atalanta*-red is, perhaps, found in the behaviour of the reddish-marked species, *Hyria auroraria* and *Acidalia rubricata*.* It is exceedingly interesting that these belong to the Geometræ, among which, as I have already pointed out,† red seems to be so exceedingly rare.‡

(To be continued.)

CONTRIBUTIONS TO THE ENTOMOLOGY OF THE PORTSMOUTH DISTRICT.

By W. T. PEARCE.

RHOPALOCERA.

In my former paper (Entom. xxiii. 227), by some means I omitted *Gonopteryx rhamni*. The Pieridæ, therefore, should be credited with 9 species; and the total number of Rhopalocera for the district, 47 species.

Gonopteryx rhamni.—Common in woods north of Portsdown Hill; sparingly on Portsdown Hill. I have seen it on the ramparts at Gosport, and in the Stoke Road; it occurs sparingly in Alder Marsh; and is common at Grange and Rowner. On Portsea Island, Mr. H. Moncreaff tells me it occurs at Tipnor; and no doubt it occurs at Fareham, a district I have not yet worked.

The former possessor of my copy of Stainton's 'Manual' notes Shedfield, a village near Botley, as a locality for the following species:—*Colias edusa* and *C. hyale*, *Satyrus semele*, *Limenitis sibylla*, *Vanessa cardui*, *Argynnis paphia*, *Melitæa aurinia* (*artemis*), *Thecla betulæ*, *Lycæna ægon*, *Syrichthus malvæ* (*alveolus*), *Nisoniades tages*.

HETEROCERA.

SPHINGES.

In dealing with this group, I shall confine myself more closely to the district proper than I did with the butterflies. From an area of about 28 square miles, a large proportion of which is water, there are recorded no less than 18 species, including such rarities as *Deilephila livornica*, *Chærocampa celerio* and *C. nerii*. To these we must add 5 species, which occur within easy distance of Portsmouth; thus making a total of 23 species for the district, rather more than half of our British species.

SPHINGIDÆ.

Acherontia atropos.—This species is to be found here in one or more stages nearly every year, and sometimes in numbers. In 1885 over 200

* See Entom. xxiii. p. 249. I find it noted in my records of experiments that on washing this species (*rubricata*) a "faintest possible pinkish tinge" was restored.

† See *antea*, p. 38.

‡ Quite recently I have found another species, viz., *Anartia amalthæa*, which is marked with scarlet, identical in its behaviour with the scarlet of *atalanta*. The red of *Heliconius amaryllis* is intermediate between the two classes of red.

larvæ and pupæ were obtained by Mr. R. Stent and myself from the potato diggers at Portsmouth and Gosport. Several imagines were also taken.

Sphinx convolvuli.—Occurs throughout the district, but is rarely found in any great numbers. In 1885 it appeared rather freely, and several specimens, captured at Portsmouth, came under my notice. In one case a neighbour sent for me, as there was something she was very much afraid of on her door-mat. I was not at home, but my sister went, and secured a slightly worn female of this species.

S. ligustri.—Common throughout the district. On one occasion I secured 16 full-fed larvæ at Cosham.

Deilephila livornica.—One at jasmine blossom, by Mr. T. H. Larcom, in his garden at Gosport, July 18th, 1884. This specimen was recorded as *D. lineata* by myself (Entom. xvii. 234), and is now in the collection of the Rev. A. C. Sladen, of Newbury, Berks.

Chærocampa nerii.—In August, 1885, at Portchester, a milkman, named Gates, whilst going his rounds, found a larva of this species on the periwinkle (*Vinca* sp.). He picked the stem on which it was resting, and, after carrying it some distance in his button-hole, gave it to a beginner, named Russell, who was successful in rearing the imago. Messrs. Moore and King, to whom I am indebted for this information, say the specimen is a very fine one.

C. celerio.—Three specimens at Gosport: one taken by Mr. Larcom in his garden, September 15th, 1879, recorded, Entom. xv. 190, and now, I believe, in the collection of the former editor of the 'Entomologist,' Mr. Carrington; one, found in the Royal Academy, is in the collection of Mr. Spriggs; and Mr. Lacey has one which was found by Mr. Loney on his vine in Stoke Road. Some years ago, Mr. Moncreaff found a larva of this species near a vine at Southsea, but was not successful in rearing it.

C. porcellus.—Fairly common at Gosport and in Portsea Island. Is probably to be found throughout the district.

C. elpenor.—Gosport. Not common.

Smerinthus ocellatus.—Fairly common at Gosport (Mr. Larcom took 14 larvæ in one season) and in Portsea Island.

S. populi.—Probably the commonest *Sphinx* in the district. It is very numerous some seasons on the street-lamps; at Gosport I have seen as many as three on one lamp.

S. tilia.—Scarce: 1 larva at Fareham in 1887 (Mr. W. King); 7 larvæ at Portsmouth, 1889 (Mr. Jones and Mr. Careless). About ten years ago I was told of a capture on a street-lamp at Gosport; but neither Mr. Larcom nor myself have met with the species.

Macroglossa stellatarum.—Common at the flowers of the viper's-bugloss on Portsdown Hill; Cumberland Fort, Portsea Island. Mr. Stent captured a specimen indoors at Portsea, it having probably been attracted by bright-coloured wall-paper. I once found a specimen sunning itself on a gate at Gosport; but Mr. Larcom and myself have not found it very numerous here.

M. fuciformis.—Not common. Stakes Wood; Purbrook Common; Grange.

M. bombyliiformis.—Two, Stakes Wood, Mr. Larcom, 1886.

SESIIDÆ.

Sesia tipuliformis.—Common among currant bushes.

S. asiliformis.—One, Scratch-face Lane, 1888 (W. T. P.).

S. myopiformis.—"Used to be common at Copnor," Portsea Island (Mr. J. J. Moore).

S. culiciformis.—One, by a beginner, in Stakes Wood, 1887; now in my collection.

S. ichneumoniformis.—Portsmouth Hill. Not common.

S. chrysidiformis.—Bred from roots of dock at Southsea, 1885 (Mr. H. Moncreaff).

ZYGÆNIDÆ.

Ino statices.—Some years common in a meadow at Purbrook.

Zygæna trifolii.—In the same locality as *I. statices*, and, like it, rather uncertain in its appearance, but is usually the commoner of the two. It also occurs near Denmead (Mr. King). Var. *confluens*.—Occasionally at Purbrook.

Z. filipendulæ.—Common. Portsmouth Hill; Cosham; Eastney; Brown-down.

101, Mayfield Road, Seafield, Gosport, March 12, 1891.

A PRELIMINARY LIST OF THE INSECT-FAUNA OF MIDDLESEX.

COMPILED BY T. D. A. COCKERELL.

(Continued from p. 69).

THE following sources of information are additional to those already given:—

(18.) F. C. Pratt. A MS. list of Coleoptera, taken mostly in South Kensington.

(19.) R. South. A MS. list of Middlesex Pterophoridaæ.

(20.) Alfred Sich. A MS. list of Lepidoptera, taken at Chiswick.

(21.) A. H. Shepherd. A MS. list of Lepidoptera, taken in the N. and N.W. districts of London, 1865 to 1890.

(22.) F. A. Walker. A list of the insects of Hampstead, in 'Hampstead Hill,' by J. Logan Lobley, 1889.

LEPIDOPTERA.

Pterophoridaæ.

This family, as here constituted, includes as subfamilies *Chrysocoridinæ* (*Chrysocorys*), *Pterophorinæ* (*Pterophorus* and allies), and *Alucitinæ* (*Alucita* = *Orneodes*). The nomenclature of the group has been much altered of late, but I have preferred to follow the older arrangement in the present paper, not feeling competent to decide how far the proposed changes should be adopted. Most of what is known about the plume-moths of Middlesex is from the investigations of Mr. South.

Cncæmidophorus rhododactylus, Fb., "not uncommon between 1874 and 1878 at several places near Mill Hill Station. I have

not met with the species lately in that locality. A specimen was once taken on a gas lamp at Finchley Station, G.N.R., by Mr. E. G. Meek" (South). See also Entom. 1878, p. 253.

Platyptilia gonodactyla, Schiff., Dalston (Prout); Mill Hill, Harrow (South). *P. bertrami*, Rössl., near Mill Hill Station (South). See also Entom. 1885, p. 97.

Amblyptilia acanthodactyla, Hb., Chiswick, two larvæ on wild geranium (Alfred Sich).

Mimæseoptilus bipunctidactylus, Haw., often common at Mill Hill; occurs among the herbage in the hedgerows bordering meadows (South). *M. pterodactylus*, L., between Pinner and Rickmansworth (South).

Edematophorus lithodactylus, Tr., Isleworth (Miss A. S. Fenn, fide F. G. Fenn); Bedford Park, on the railway-bank (Ckll.). This species must be rare or absent in the northern part of the county, as Mr. South remarks that he has not met with it.

Pterophorus monodactylus, L., Hampstead, Kingsbury, Harrow, Mill Hill, very common (South).

Aciptilia pentadactyla, L., in the same localities as *P. monodactylus* (South); Bedford Park (Fenn); Isleworth (Fenn); Dalston (Prout); Finchley (Shepherd); Harefield, common (Wall). In Entom. 1883, p. 27, Mr. South mentions only *Calystegia sepium* as the food-plant of this species. At Beckenham, in Kent, I used to find the larvæ abundantly on *Convolvulus arvensis*, which is perhaps the more usual food-plant in the London district.

Alucita hexadactyla, L., Harefield, common (Wall); Mill Hill (South); Tufnell Park (Shepherd). Mr. South writes (*in litt.*, Feb., 1891):—" *Aciptilia galactodactyla*, Hb., ought most certainly to occur in the county, but so far I have not met the species in any stage." *A. galactodactyla* has been recorded from Kent and Surrey, and probably some other of the bordering counties.

COLEOPTERA.

Staphylinidæ, subfam. *Aleocharinæ*.

Autalia rivularis, Grav., Bloomsbury (Brit. Mus.).

Falagria sulcata, Payk., South Kensington (Pratt); Bloomsbury (Brit. Mus.). *F. obscura*, Grav., South Kensington (Pratt).

Silusa rubiginosa, Er., Hanwell, on bark of elm trees (Fowler).

Ocalea latipennis var. *rivularis*, Mill., near Hammersmith (Champion).

Euryusa laticollis, Heer, Highgate (Fowler).

Microglossa suturalis, Sahl., Acton (Pratt).

Aleochara ruficornis, Grav., Hampstead (Fowler). *A. fuscipes*, Grav., near Pinner (Legros); South Kensington (Pratt); Bloomsbury (Brit. Mus.). *A. morion* Grav., Bloomsbury (Brit. Mus.). *A. lanuginosa*, Grav., Neasden (Legros); South Kensington

(Pratt); Bloomsbury (Brit. Mus.). *A. mæsta*, Grav., Bloomsbury (Brit. Mus.). *A. nitida*, Grav., South Kensington (Pratt); Bloomsbury (Brit. Mus.).

Myrmedonia humeralis, Grav., Bloomsbury (Brit. Mus.).

Astilbus canaliculatus, Fab., Bloomsbury (Brit. Mus.).

Ilyobates nigricollis, Payk., Notting Hill, olim (Fowler).

Calodera nigrita, Mann., Hampstead (Fowler). *C. rubens*, Er., Cowley, near Uxbridge (Fowler). *C. umbrosa*, Er., Bloomsbury (Brit. Mus.).

Alianta incana, Er., Notting Hill, olim (Fowler).

Chilopora longitarsis, Er., Bloomsbury (Brit. Mus.).

Tachyusa concolor, Er., Bloomsbury (Brit. Mus.).

Oxypoda spectabilis, Märk., Highgate (Fowler). *O. vittata*, Märk., South Kensington (Pratt). *O. lentula*, Er., Notting Hill (Fowler). *O. pectita*, Sharp, Hammersmith (Fowler). *O. umbrata*, Gyll. = *brevicornis*, Steph., Bloomsbury (Brit. Mus.). *O. mutata*, Sharp, Colney Hatch (Fowler). *O. alternans*, Grav., Bloomsbury (Brit. Mus.). *O. recondita*, Kr., Highgate (Fowler). *O. hæmorrhœa*, Sahl., South Kensington (Pratt); Bloomsbury (Brit. Mus.). *O. (amœna* var.?) *waterhousei*, Rye, Hampstead (Waterhouse). *O. annularis*, Sahl., Hampstead and Highgate (Fowler). *O. tarda*, Sharp, South Kensington (Pratt).

Homalota: As this genus is so inconveniently large, I divide our species provisionally into sections or groups as seems convenient, mainly after Canon Fowler's arrangement.*

a. *Languidæ*.

Homalota languida, Er., Hammersmith Marshes (Fowler).

d. *Fallaces*.

H. fallax, Kr., Notting Hill (Fowler).

e. *Elongatulæ*.

H. luridipennis, Mann., Bloomsbury (Brit. Mus.). *H. hygrotopora*, Kr., Bloomsbury (Brit. Mus.). *H. elongatula*, Grav., Bloomsbury (Brit. Mus.).

f. *Glossolæ*.

H. gregaria, Er., Bloomsbury (Brit. Mus.).

g. *Paganæ*.

H. vestita, Grav., South Kensington (Pratt). *H. sylvicola*, Fuss., Highgate (Fowler). *H. vicina*, Steph., Bloomsbury (Brit. Mus.). *H. pagana*, Er., Bloomsbury (Brit. Mus.).

* It is rather an innovation to give plural names to the sections, and Canon Fowler, to whom I sent a copy of the list of species and section-names, writes, "I must confess that I do not like the plan at first sight." But the same method has been long in use in Botany, &c., and I believe is a very advantageous one.

i. *Occultæ*.

H. occulta, Er., Bloomsbury (*Brit. Mus.*). *H. picipes*, Thoms., Bloomsbury (*Brit. Mus.*). *H. debilis*, Er., Notting Hill (*Fowler*).

l. *Geminæ*.

H. gemina, Er., Hammersmith Marshes (*Fowler*).

m. *Viles*.

H. analis, Grav., South Kensington (*Pratt*); Bloomsbury (*Brit. Mus.*). *H. decipiens*, Sharp, Hammersmith (*Fowler*).

o. *Hepaticæ*.

H. hepatica, Er., Bloomsbury (*Brit. Mus.*).

q. *Palustres*.

H. xanthopus, Thoms., Kilburn and Hampstead (*Fowler*). *H. triangulum*, Kr., Bloomsbury (*Brit. Mus.*). *H. nigrītula*, Wat. = *boletobia*, Thoms., Bloomsbury (*Brit. Mus.*). *H. divisa*, Märk., Bloomsbury (*Brit. Mus.*). *H. palustris*, Kies., Bloomsbury (*Brit. Mus.*).

r. *Autumnales*.

H. autumnalis, Er., Hampstead (*Fowler*).

s. *Inconspicuæ*.

H. mortuorum, Thoms., Highgate (*Fowler*). *H. (mortuorum var. ?) atricolor*, Sharp, = *inconspicua*, Wat., Bloomsbury (*Brit. Mus.*). *H. inquinula*, Grav., Bloomsbury (*Brit. Mus.*).

u. *Sordidulæ*.

H. nigra, Kr., Bloomsbury (*Brit. Mus.*). *H. (celata var. ?) germana*, Sharp, Highgate (*Fowler*). *H. celata*, Er., Hampstead (*Fowler*). *H. sordidula*, Er., Bloomsbury (*Brit. Mus.*). *H. canescens*, Sharp, Highgate (*Fowler*).

v. *Marcidæ*.

H. marcida, Er., Highgate (*Fowler*). *H. intermedia*, Thoms., Highgate (*Fowler*). *H. longicornis*, Grav., South Kensington (*Pratt*). *H. levana*, Muls., Highgate (*Fowler*). *H. cinnamoptera*, Thoms., Hampstead (*Fowler*). *H. villosula*, Kr., Bloomsbury (*Brit. Mus.*). *H. atramentaria*, Gyll., South Kensington (*Pratt*); Bloomsbury (*Brit. Mus.*). *H. (levana var.) setigera*, Sharp, Hampstead (*Fowler*).

w. *Sordidæ*.

H. sordida, Marsh. = *melanaria*, Sahl., South Kensington (*Pratt*); Bloomsbury (*Brit. Mus.*). *H. testudinea*, Er., Highgate (*Fowler*).

x. *Subsinuatæ*.

H. laticollis, Steph., Bloomsbury (*Brit. Mus.*). *H. subsinuata*, Er., *castanipes*, Wat., Bloomsbury (*Brit. Mus.*). *H. monti-*

vagans, Woll., Hanwell (Fowler). *H. fungi*, Grav., South Kensington (Pratt); Bloomsbury (Brit. Mus.). *H. orphana*, Er., Hammersmith Marshes (Fowler).

Placusa pumilio, Grav., Highgate (Fowler).

P. denticulata, Sharp, Bishop's Wood (Fowler).

Phlæopora corticalis, Grav., Hampstead (Fowler).

Oligota atomaria, Er., Colney Hatch (Fowler). *O. inflata*, Mann., Bloomsbury (Brit. Mus.). *O. flavicornis*, Lac., Kennington (Fowler).

Gyrophæna nana, Payk., Bishop's Wood (Fowler). *G. lucidula*, Er., Hammersmith Marshes, *olim* (Fowler). *G. minima*, Er., Bishop's Wood (Fowler).

3, Fairfax Road, Bedford Park, Chiswick, W.

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

NOTES ON LEPIDOPTERA TAKEN IN THE BLOXWORTH DISTRICT IN 1890.—It seems rather late in the day, now that we are just entering upon the season of 1891, to record the entomological doings of 1890; but various circumstances have hitherto prevented the earlier compilation of the following notes. On the general character of the entomological year 1890 I can fully endorse the accounts given of it by many other entomologists. I think I have known seasons as barren, but scarcely any one more so than the past. One night at sugar, in June, produced eight *Aplecta herbida*, one *Leucania comma*, and a few other common Noctuidæ, but on several following nights not a single moth of any kind was seen. Sugaring was again wholly unproductive in August. Many of our commonest Geometridæ were either missing altogether or only appeared as great rarities; nor did I see a single *Plusia gamma* during the whole season. Even wasps were here very scarce (though at Cadbury, in Somerset, there were swarms of them about the end of August). *Psoricoptera gibbosella* was worked for, but not a single specimen was seen where in 1888 we took it in abundance. The above being the general character of the year, we still captured some good things, among which were—*Nemeobius lucina* (not nearly as abundant as in 1889, when twenty-five were netted in one day); *Drepana hamula*; *Tapinostola fulva*; *Tephrosia extersaria*; *Cleora glabraria*, one specimen, just out, in an orchard, new to Dorsetshire; *Eupisteria heparata*, one, worn, new to this district; *Aventia flexula*; *Scoparia mercurella*, a var. of the inland form, corresponding exactly to the var. *S. portlandica*, which occurs amongst those of the species found in the Isle of Portland. *Aciptilia paludum*, only ten examples during many evenings' work. *Peronea comariana* in great abundance among *Comaria palustris* in a swampy spot on the heath; out of 120 specimens taken only three were females; the reddish brown variety of the male was less abundant than the greyer form. *Ditula semifasciana*, two specimens; *Phoxopteryx lundana*, abundant, many of them of large size; *Cnephasia sinuana*, three examples only. *Chrosis audouinana*, one, rather worn: this is only the second specimen I have ever met with here; the other was taken in 1865. *Eupecilia notulana*, one; *E. pallidana*, several,

on the borders of the heath near Wareham; *E. geyeriana*, between fifty and sixty, on a small patch of swamp, from August 5th to 22nd, flying freely at dusk. I am indebted to Mr. Barrett for kindly examining and determining this addition to the Dorset list. *Argyrolepis cnicana*, rather abundant. *Scardia arcella*, several, flying at dusk; *Tinea albipunctella*, one, beaten out among overgrown coppice wood in a swamp; *Phylloporia bistrigella*, several flying at dusk; *Lampronia praelatella*, very abundant; *Cerostoma lucella*, three specimens only; *C. alpella*, only one, where two years ago it was fairly abundant. Of *C. sylvella*, in most seasons fairly common, not one was taken. *Gelechia rhombella*, several in an orchard; *Lita maculea*, one only; *Pacilia albiceps*, one; *Ptocheuusa subocellea*, several, among marjoram; *Cleodora cytisella*, one only; *Chelaria hübnerella*, unusually abundant—among them a variety with the usually dark blackish mark on the costa of a bright rufous colour; *Glyphipteryx thrasionella*, so abundant as to be quite a pest. *Tinagma betulæ*; the occurrence of this species has already been noticed in the 'Entomological Monthly Magazine' (Feb. 1891, p. 48), by Mr. Eustace Banks, who was the first to observe its work here on the birch leaves last autumn. Subsequently I found a fine example of the perfect insect in my cabinet, doubtfully placed under *resplendellum*, and kindly determined to be *T. betulæ* by Dr. Wood. This specimen was caught on the wing in July, 1887. The little oval holes cut out by the larvæ, near the footstalk of the birch leaves, were abundant; on the dwarf birch bushes I often found six or seven on each. Whether we shall be able to detect the larvæ while feeding inside the birch shoots, next summer, or obtain the perfect insect in any quantity by breeding or sweeping, remains to be seen; but that it is an abundant species here there seems to be little doubt. *Gracilaria elongella*, in an oak and birch wood; *Chauliodus illigerellus*, frequent, flying at dusk, but not as abundant as in some past seasons; *Laverna paludicolella*, one only, of unusual size; *L. lacteella*, not unfrequent, flying rapidly at dusk, and swept among herbage; *Chrysoclysta schrankella*, fairly abundant, by sweeping, and flying in sunshine, but very local. *Asychna terminella*: several of this little gem flying at dusk, and swept among low underwood and coarse herbage. *Elachista gleichenella*, several; *E. monticola*, not rare (appears to be very like *E. poellæ*), new to Dorset—my examples have, some of them, been determined by Mr. Stainton; *E. paludum*, four examples, in a swamp among sedgy grass, new to Dorset. *Lithocolletis anderidæ*, bred from mines in birch-leaves gathered in the previous October, new to Dorset: on this species see notes by Mr. N. M. Richardson (Ent. Month. Mag., Jan. 1891, p. 22), and by Mr. H. T. Stainton (l. c. 1890, p. 192). *Bucculatrix aurimaculella*, several, swept; *Nepticula æneofasciella*, several, bred from mines in wild strawberry-leaves gathered in November, 1889; *N. gei*, one, bred also from wild strawberry-leaves. — O. P. CAMBRIDGE; Bloxworth Rectory, March 10, 1891.

NOTES ON THE LEPIDOPTERA OF MIDDLESEX.—*Argynnis euphrosyne* was formerly common in Highgate Wood; when I first visited this locality, in 1855, I met with the species in abundance, and took it there for several subsequent years. *Hesperia sylvanus* was also common then in the same spot; and a few *Syrichtus alveolus*. In some grassy hollows on the edge of Coleford Wood at Fortiss Green, I used, about the same time, to take *Thanaos tages*, *Hesperia linea*, *Epinephele hyperanthus*, and many other species. I merely mention the above Rhopalocera, as being the nearest

place to the metropolis that I have ever met with them, and where (alas!) they will, I fear, never be met with again.—C. J. BIGGS; 3, Stanley Terrace, West Ham Park, E.

CAPTURES AT GAS-LAMPS.—My notes record the final break-up of “the great frost” on January 23rd. On and after the 27th, a few *Cheimatobia brumata* appeared on the gas-lamps. Whether before or after Christmas, I have never previously seen this moth in such small numbers at the lamps. I worked hard in November for *Pæcilocampa populi* and *Asteroscopus sphinx* (*cassinea*), but failed to come across a single specimen. In fact, to quote another local entomologist, “there have been very few moths at the lamps this season.” February 3rd brought out *Phigalia pedaria* (*pilosaria*, dark forms) and *Hybernica rupicaprararia*. Additional insects up to date (February 10th) are as follows:—February 6th, *H. marginaria* (*progemmaria*); February 7th, dark forms of *H. defoliaria*. *C. brumata* apparently disappeared with the end of January.—J. ARKLE; 2, George Street, Chester.

ASSEMBLING.—I shall be greatly obliged to any reader of the ‘Entomologist’ who can give a complete catalogue of all the species in which “assembling” has been observed. I believe that besides the *Bombyx* group, instances are known also among the Geometræ. Has it ever been observed in any Noctuæ or Sphingæ also?—F. H. PERRY COSTE; Ravenshoe, Burnt Ash, March 4, 1891.

PIERIS RAPE IN FEBRUARY, 1891.—I noticed a specimen of this insect flying about some laurels in this neighbourhood on February 25th. Besides the ones recorded in the March number, the only instance I have been able to find of so early a date is quoted by Newman (‘British Butterflies’), from ‘Entomologist,’ vol. iv. p. 80: this was February 24th.—H. A. EVANS; Westward Ho, North Devon.

HYBERNIA DEFOLIARIA IN FEBRUARY.—Last month (February) I heard from a friend, who only began to collect in 1890, and whose knowledge is, therefore, chiefly derived from books, that he had just taken an insect which seemed to agree with *H. defoliaria*, but which could not be that species, as Newman gives October, and Stainton, October and November, for its appearance. I wrote back to say that the moth was, nevertheless, *H. defoliaria*. The first year I ever remember seeing *defoliaria* later than November was in January, 1884, and, being much surprised, I mentioned it when writing to Mr. Harwood, of Colchester, who informed me that he came across the species occasionally during the early months of spring. Since that year I have noticed it once or twice sitting on park fences in January and February; but, whereas last year I found a single specimen only (January 16th), this year I came across as many as ten—one each on January 23rd and 28th, seven on February 4th, and one on March 4th, the latter being the latest date I have recorded. These specimens were all males; but I find I have in my cabinet a female, labelled “24th February, 1885.” None of the males were in fine condition, so that I presume they were born in October or November, and managed to survive the rigours of an English winter; hence I am surprised at taking so many specimens this spring, the winter of 1890–91 being one of the severest on record. If my hypothesis (of hibernation) be correct, *H. defoliaria* is by far the earliest hibernated species to venture forth after its winter sleep, preceding even *Depressaria applanata*, so far as my experience goes.—(Rev.) GILBERT H. RAYNOR; Victoria House, Brentwood, Essex, March 16, 1891.

ENTOMOLOGY OF THE PORTSMOUTH DISTRICT.—I am desirous of making a complete catalogue of the entomology of the Portsmouth district, and would be glad if entomologists who have collected in this district will let me have lists of their captures in all orders. Lists will be returned, if desired.—W. T. PEARCE; 101, Mayfield Road, Seafield, Gosport.

ANOTHER NAUSEOUS INSECT EATEN BY A WOODPECKER.—On the 28th of January last, I received from Mr. W. Perry, of Broxton Old Hall, Cheshire, a female specimen of the great spotted woodpecker (*Picus major*, L.), which had been shot in that neighbourhood. On examining the stomach of this bird, I was very agreeably surprised to find that it contained at least four specimens of a *Coccinella*, undoubtedly the very common *Hippodamia variegata*, Goetz. (= *mutabilis*, Schrib.). In addition to these there were a number of the larvæ, and two imagines, of *Rhagium bifasciatum*;* the former almost filled the stomach, and several of them were almost digested, their heads only remaining, which proves, beyond all doubt, that they were eaten sometime before the *Coccinella*, as the latter were quite fresh at the time of my examination. This, I think, should prove of some interest to those who are at all interested in the "uses of colours in animals," or in the Darwinian theory. In his very interesting little book ('Colours of Animals,' p. 180), Mr. E. B. Poulton says:—"That ladybirds are eaten by green tree-frogs in winter, when other insect-food is scarce; and also by hungry birds, although intensely disliked, and are refused (at any rate, by the frogs) if other food can be obtained." Mr. Poulton kindly informed me that these facts are based entirely upon experiments with captive animals; hitherto, nothing in a state of nature has been known to feed upon the Coccinellidæ. At first sight my observations appear to verify Mr. Poulton's statements, but the woodpecker could not have been in a state of hunger when it ate the nauseous insects, for reasons previously stated. We must also bear in mind that the woodpeckers are less affected by severe weather than any other bird, as the greater part of their food is obtained from timber, which is always available. I am, therefore, of opinion that this species of woodpeckers, and probably other members of the genus, like the cuckoo [*ante*, pp. 19, 77], will feed upon nauseous insects at any time of the year; this, however, can only be proved by the examination of birds during months when plenty of edible food is available. I hope that my very brief remarks may incite others, who have the opportunity to examine the stomachs of insectivorous birds, to do so whenever opportunity offers; curators of museums, abroad as well as in this country, could help very materially by preserving the stomachs for any specialist who might care to examine them. Degraded as this branch of Entomology may appear to many, it is, nevertheless, of very great interest. I should be very glad to hear the opinions of others who are interested in this subject.—R. NEWSTEAD; Grosvenor Museum, Chester, March 14, 1891.

LATE EMERGENCE OF *PÆCILOCAMPA POPULI*.—During the week ending January 24th a female specimen of *Pæcilocampa populi* emerged in breeding-cage kept out of doors. Doubtless the extreme cold for some time previous retarded its emergence. I have obtained many ova from this *unimpregnated* specimen, the greater portion dark in colour, with all the *appearance* of fertile ova, the remainder being a light red-brown.—T. B. JEFFERYS; Bath, February 3, 1891.

* The larvæ of this coleopteron seem to be their favourite food, as I have found them in other examples that I have examined.—R. N.

ANNUAL EXHIBITION OF THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—The Exhibitions of this Society have, year by year, been increasingly successful, and there is but little doubt that the exhibition announced to be held at the Bridge House Hotel, London Bridge, on the 15th and 16th of April next, will be quite equal to, if it does not surpass, any of the Society's previous achievements. Evidence of the popularity of these "shows" is found not only in the very large attendance on each occasion that an entertainment of the kind is provided, but also in the fact that if from any cause the exhibition is not held in any year there is general disappointment, and a feeling that a distinct void has occurred in the record of that year. Several circumstances conspired to prevent the Society holding their "Annual" last year; but the outcome of the failure in the autumn of 1890 is a spring exhibition in the present year, so that instead of a loss we have what should prove a decided gain. The Hon. Sec., Mr. H. W. Barker, 83, Brayards Road, Peckham, S.E., will be pleased to hear from anyone wishing to assist by exhibiting entomological or other objects of Natural History.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*March 4th, 1891.*—The Right Hon. Lord Walsingham, M.A., F.R.S., Vice-President, in the chair. Mr. H. St. John Donisthorpe, Mr. F. W. Frohawk, Mr. Charles Fryer, Mr. G. F. Hampson, B.A., Mr. Frederick J. Hanbury, F.L.S., and Mr. G. B. Routledge, were admitted into the Society. Mr. F. P. Pascoe exhibited, and made remarks on, a curious Coleopterous larva with a case somewhat resembling that of the Lepidopterous genus *Psyche*, which was found at the Theatre of Bacchus, Athens. Mr. J. W. Douglas sent for exhibition specimens of *Icerya* (*Crossatosoma*) *egyptiaca*, which, through the kindness of Mr. A. D. Michael, he had received from Alexandria on the 19th January last. It was stated that in travelling most of them had become loose, and had lost their waxen appendages; but a few still remained on the stems of their food-plant. In connection with this subject, Mr. G. H. Verrall alluded to a Dipterous parasite of *Icerya* from Adelaide, —*Lestophonus iceryæ*, Williston,—which had been bred from *Icerya purchasi*, Mask., last February. Mr. M'Lachlan and Lord Walsingham continued the discussion. Mr. R. Adkin exhibited a long and interesting series of *Triphæna comes* from various parts of the South of England, Yorkshire, Forres, the Isle of Man, the Isle of Lewis, and the North of Ireland. Mr. G. F. Hampson exhibited a series of varieties of *Plotheia frontalis*, Walk., which was the only species in the genus, and confined to Ceylon. He said that the varied forms of this species had been described under twenty-one different names by Walker, Felder, and Moore. Mr. F. Merrifield showed a number of specimens of *Selenia illustraria*, of three different stocks, proving that the spring brood of this species, which passed the winter in the pupal stage, was, like the summer pupa, materially affected in colouring by the temperature to which the pupa had been exposed in its later stages. He thought this fact, coupled with similar results ascertained with respect to the single-brooded *Ennomos autumnaria*, indicated that the operating cause was one of wide general application, and that valuable results might be looked for if entomologists would turn their

attention to the subject. Capt. Elwes said that in his experience in many parts of the Palæarctic region, in Japan, in the Taunus Mountains, in the Canary Islands, and elsewhere, where there was a combination of heat and moisture, all the commoner species of Lepidoptera occurring in this country attained a larger size and a greater brilliancy of colouring than in colder and drier regions; and he referred to such species, amongst others, as *Pieris brassicae* and *Argynnis paphia*. The discussion was continued by Mr. Jacoby, Mr. Fenn, and others. Mr. W. H. B. Fletcher exhibited a long series of *Zygæna lonicerae* from York, and *Zygæna filipendulae* from Shoreham, Sussex; also a series of hybrids obtained by crossing these two species. He stated that the eggs obtained from these hybrids were all infertile. Lord Walsingham said this latter fact was extremely interesting. Mr. F. W. Frohawk exhibited a living specimen of an ichneumon which had just emerged from a chrysalis of *Papilio taunus*. Mr. C. J. Gahan exhibited a number of species belonging to the genera *Lema* and *Diabrotica*, and read a paper on them, entitled "On mimetic resemblances between species of the Coleopterous genera *Lema* and *Diabrotica*." Lord Walsingham, Mr. Jacoby, Colonel Swinhoe, and Mr. Champion took part in the discussion which ensued.—H. GOSS and W. W. FOWLER, *Hon. Secs.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY. —February 26th, 1891. Mr. W. H. Tugwell, President, in the chair. Mr. R. J. Anderson, of Suez, was elected a member. Mr. Adye exhibited an unusually dark form of *Notodonta camelina*, L., with other forms of the species. Mr. H. Moore, *Erebus odora* from South America. Mr. Turner, *Melanippe fluctuata*, L., taken at Brockley; the specimens showed considerable variation. Mr. Cockerell, *Heliothis armigera*, var. *umbrosa*, Grote, from Wet Mountain Valley, Colorado, larger than the type, the upper wings more or less olivaceous above, the under wings almost without markings below. Mr. Cockerell made some remarks on *Leucania unipuncta*, which he stated was a great scourge in America, and was there known as the army worm. Mr. R. Adkin exhibited long series of the species of the genus *Triphæna*, Och., from many localities in the British Islands, together with continental series of some of the species for comparison, and read notes dealing with the geographical distribution and general and local variation of the species exhibited. In dealing with *T. comes* he pointed out Hübner's typical form, the varieties *adsequa* and *prosequa* of Treitschke, and *curtisii* of Newman, also Hübner's *consequa*, which he considered should be regarded as a form of this species rather than of *orbona*, Hufn., to which it had hitherto been referred, and supported his contention by specimens known to be forms of *comes*, Hb., which agreed with Hübner's figure of *consequa*. He also described the distinguishing characters of these varieties, and gave notes on the nomenclature of the species. Mr. C. Fenn exhibited examples of the genus *Triphæna* from Forres. Mr. McArthur, *T. comes* from the Isle of Lewis, and *T. ianthina* from Northumberland. Mr. Turner, *T. pronuba* from Brockley, Kent. Mr. South and Mr. Tugwell also showed varieties of many species of the genus, and a discussion ensued, Messrs. South, Fenn, Tugwell, Adkin, and others taking part. Mr. E. Step exhibited an hibernating specimen of *Vespa germanica* (female); Mr. Billups remarked that he had taken this species as early as the 17th January in a previous year.

March 12th.—The President in the chair. Mr. E. F. Elton, of Wokingham, was elected a member. The Secretary read a report of a Committee

which had been appointed to enquire into the numerical and financial position of the Society, from which it appeared that since the year 1885 the number of members had increased yearly, and as a consequence, so also had the finances of the Society. Mr. R. Adkin exhibited *Pædisca solandriana*, L., bred from larvæ feeding in shoots of birch from Aberdeen; and, on behalf of Mr. W. Smith, sundry Tortrices and Crambites from Paisley, including a white and dark-blotched variety of *Pædisca solandriana*, and an unusually white form of *Crambus pratellus*, L. Mr. R. South, *Vanessa urticæ*, L., to show the geographical distribution and local variation. Mr. Adye, varieties of *Abraxas grossulariata*, L. Mr. Robinson, specimens of a *Pygæa* which he stated had been supposed to be *P. curtula*; they were bought cheap in 1876. Mr. Tugwell stated it was difficult to say what the species was if it was not *curtula*; he had seen the form before. Mr. Tutt remarked that he had seen the form in the Doubleday Collection. Mr. Carrington exhibited and made remarks upon some plants collected by him at Toulon. Mr. Billups read a paper on the Hymenopterous and Dipterous parasites bred by members of the Society during the years 1889-90; the paper was illustrated by the exhibition of the various species mentioned in the paper, and in many cases by the host from which the parasites had been bred.—H. W. BARKER, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—*February 16th, 1891.*—Mr. R. C. Bradley in the chair. Messrs. C. J. Fryer, Warwick; and A. Madeley, Dudley, were elected members of the Society. Mr. R. C. Bradley showed *Sphenella marginata* from Bournemouth. Mr. E. C. Tye read a paper (written conjointly with Mr. G. W. Wynn) on the Lepidoptera of Marston Green. It was written with the purpose of showing what might be, rather than what had been, done there; and to urge the members to work the district, which was the best ground lying within easy reach of Birmingham. The paper described the ground, which includes Packington Park and many fine lanes and woods; and also included a short list of good things already taken there.

March 2nd, 1891.—Mr. R. C. Bradley in the chair. Mr. J. J. Quirke, jun., Handsworth, was elected a member. Mr. R. C. Bradley showed *Trypeta centauriæ* from Moseley. Mr. G. H. Kenrick, a specimen of *Triphæna pronuba*, bred January, this year, from egg found on a withered lime leaf in first week of September, 1890. Mr. Kenrick read a paper on "Temperature, its effects on some insects not found in this district," in which he pointed out the great importance of temperature in affecting the distribution of insects. He pointed out the fact that most insects were very susceptible to heat or cold at some period in their life, which period varies in different species, and that a few degrees would often seriously affect them; and he quoted a number of species of butterflies in illustration, showing how their range in this country was undoubtedly affected by temperature. He suggested that species would often be isolated by their inability to stand slight alterations in heat and cold, and would thus be in a position to diverge from closely-allied forms, thus favouring evolution.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY.—*March 9th, 1891.*—The President, S. J. Capper, F.L.S., F.E.S., in the chair. Mr. Brocton Tomlin was elected a member. A paper by Mr. Herbert Stott was read, on "A parasitic fungus forming its base in the larva of a New Zealand Lepidopteron," illustrated by specimens and drawings. The Hon.

Sec., F. N. Pierce, read a paper entitled "Notes on the genital armature of the genus *Miana*," in which he referred to the recent controversy respecting the distinctiveness of the two species, *M. strigilis* and *M. fasciuncula*, and proved, by the examination of the structure of the genital armature, that they were specifically different; the paper was illustrated by the author's preparations thrown on a screen, by the aid of oxy-hydrogen Micro lantern; and exhibits of specimens from various parts of the country by the President and members.—F. N. PIERCE, *Hon. Sec.*

OBITUARY.

ROBERT CALVERT, of Bishop Auckland, in the county of Durham, died on the 21st of February last, in the 76th year of his age. Mr. Calvert commenced his business career as a printer in his native town, but subsequently he went to Sunderland, where he successfully carried on a grocery business. Ultimately, however, he returned to Bishop Auckland, and became the leading auctioneer and valuer of the district. Throughout an active and busy life, he always found time to study the fauna and flora of the county of Durham; and perhaps there are few men so intimate with the Natural History of their own county as Mr. Calvert was with that of his. No natural object, whether animate or inanimate, was passed unheeded. If it was known to him, then perhaps the locality in which it occurred would be new, and the circumstance be duly noted. If, on the other hand, the object was something with which he was unacquainted, it was secured, and the work entailed in its subsequent identification looked upon as a distinct pleasure. His entomological collections testify to the assiduity with which he investigated this section of his county's fauna. Although he persistently refrained from taking an active part in the discussion of scientific matters, he had well-formed opinions on most of the questions which exercise the minds of naturalists generally and entomologists in particular. His memory was a veritable storehouse of facts and observations; and it was this which lent a special charm to his companionship in an entomological ramble, for he always had some interesting reminiscence in connection with almost every nook and corner of his native county. In 1884 he published a most interesting and valuable book, entitled 'Notes on the Geology and Natural History of the county of Durham,' in the preface to which he wrote:—"For upwards of fifty years of a busy life, the observation of Natural History objects and the collection of specimens have formed the recreation of my leisure hours, and, in the retrospect of the past, yield unalloyed satisfaction and pleasure. About two years since, affliction forced me to give up the active duties of life, and since that time I have had to spend the greater portion of my time at home, deprived of the longed-for rambles to which the pursuit of Natural History ever gives a charm. To occupy my time, I commenced to write the notes which have swelled out to the present volume; and some of my friends thinking they may be of service in directing youth in the pursuit of Geology and Natural History, they are now submitted for their use." The perusal of this book causes one to feel regret that it is the only contribution to Natural History literature from his able pen.—R. S.

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THE SIGNIFICANCE OF OCCASIONAL, AND APPARENTLY UNIMPORTANT, MARKINGS IN LEPIDOPTERA.

BY J. JENNER WEIR, F.L.S., &c.

It has, no doubt, not escaped the notice of British entomologists that in *Papilio machaon* the first submarginal lunule, on the upper side of the lower wings, is often not purely yellow, but more or less suffused with red.

In English specimens of the insect I find this marking existing in females very commonly; in a female from Hyères it is faintly visible; in one out of four, from Japan, it can be seen; and is very well shown in a large female I have from Loo Choo Islands. I do not find this red mark in specimens taken by myself in Saxony, and in the Alhambra, at Granada, in Spain. Judging from those in my own cabinet it does not exist in the European *Papilio alexanor*, the Japanese *P. xuthus*, the American *P. zolicaon* and *P. americanus*: in Mr. Edwards' work on the 'Butterflies of North America' the marking is not shown in the plates of *P. indra* and *P. bairdii*; it reappears very faintly in the female of *P. polyxenes*, and very prominently in the female of *P. brevicauda*; this latter has, however, the yellow markings much suffused with red.

In the allied genera of Papilioninæ I do not find the marking in *Iphiclidides podalirius*, nor in the American *I. ajax* and its horeomorphie varieties.

In the genus *Jasoniades*, another allied division of that aptly-termed "magazine genus" *Papilio*, it exists very strongly marked in *J. glaucus*, the black dimorphic female of *J. turnus*, and in the latter yellow form in both sexes; but in this species it is often very indistinct, and I have a male specimen from Moose Factory, St. James' Bay, in which no trace of it can be seen. In *Jasoniades rutilus* there is sometimes a faint trace of red in the lunule, but not in *J. eurymedon*; and in *J. daunus* there is

not the faintest trace of the marking—indeed, the first sub-marginal lunule is almost obsolete.

In the American *Euphœades troilus* a bright red spot is found, but it is shifted back, and is a costal marking, appearing at the upper end of the blue central band of the under wings; but even in this butterfly, where it is usually very strongly developed, it is not always to be found. Mr. Scudder, in his admirable work on the 'Butterflies of the Eastern United States and Canada' (p. 1317), writes of "a specimen in which the normally orange lunule next the costal edge of the upper surface of the hind wings has no orange in it, but is of the same greenish colour as the other spots"; and I fortunately possess in my cabinet a similar example. Mr. Scudder does not state the sex of the variety, but mine is a female—a most important fact, as will be seen below, to my argument. *Euphœades palamides* does not show a trace of the reddish suffused mark under consideration. It is well here to remark that it often happens that the second lunule of the hind wings has a trace of the reddish or orange colour: this may be occasionally found in *Papilio machaon*.

Enough has been written to illustrate the fact that throughout several of the species of Papilioninæ, belonging to at least three different but more or less allied genera, there is a reddish suffusion in the upper lunule or lunules of the hind wings—that it is sometimes absent in species that usually possess it, but that, as far as my experience goes, when so absent it is in the male sex. The problem I have now to deal with is the significance of such a trivial marking. Is it rudimentary of a coloration in course of evolution? or, on the other hand, is it vestigial of a marking which has become partially, or even perfectly in some specimens, obsolete? I am inclined to hold the latter view, for the following reasons:—In all the species dealt with there is, at the anal angle of the hind wings, a more or less distinct ocellus, with red pupil or patch: this is very well marked in *Papilio machaon*. The red becomes more of an iris in some species, because there is a black spot in the centre, as in *P. xuthus*, *P. polyxenes*, *P. brevicauda*, *P. zolicaon*, and *P. americanus*. In *Jasoniades* and *Euphœades* the ocellus is blurred, but the red colour is to be found in every species of these genera at the anal angle of the hind wings.

Arguing from *à priori* considerations, one would be inclined to consider that the reddish or orange suffusion in question was the nearly obsolete trace of an ocellus which had once existed in the ancestors of these butterflies. The question then arises as to whether any facts can be adduced in support of such a hypothesis.

Africa is a continent which has not undergone those stupendous geological changes which have affected so profoundly the palæarctic and nearctic regions, from which my illustrations

have been drawn, and in which, therefore, some archaic forms of Papilioninæ might be expected to be found.

Orpheides demoleus is a well-known and very common African butterfly, which has an ocellus both on the costa and on the anal angle of the lower wings, but it is only the lower ocellus that has much red around the pupil; still I have a specimen with the costal ocellus well marked with red, exactly in the same part of the wing that a similar orange spot is found in *Euphœades troilus*, and in all cases the dark centre of the pupil is suffused with red. In the very closely allied Indian species, *Orpheides erithonius*, I cannot detect any red around the upper ocellus; the lower has a large patch of that colour, but, regarded as an ocellus, it is indistinct, especially in the males; indeed, in both these species the costal ocellus is much better defined than that at the anal angle. Both are without tails, and it would seem that the development of the tails in *Papilio*, *Jasoniades* and *Euphœades*, destroyed the original bilateral symmetry of the under wings, and reduced the costal ocellus to a mere vestige: and in *Iphiclides*, where the tails are more developed, even the slight vestige has disappeared. The shape of the wing in this last-mentioned genus is quite different from that of *Papilio*—the length of the tails seem to have been effected at the expense of the breadth of the wing; indeed, in this respect *Iphiclides* approaches more nearly to the contour of the wing of *Leptocircus*.

A similar remark applies to the Indian genus of Swallow-tails, *Pathisa*: in *P. agetes* there are red spots above an obsolete ocellus in the anal angle of the wing, but no red at the upper angle; in some of the other species even the red at the anal angle has faded into yellow—e. g., *P. paphus* and *P. glycerion*, and in *P. antiphates* the yellow above the pseudocellus has disappeared.

There is another genus of African Papilioninæ possessing large tails, and in the male sex, on the upper wings, there are androconia on the submedian nervure and median nervules clothed with short cotton-like scales. I do not think this genus has been named, but it appropriately might be called *Erioptera*. In *E. ophidicephalus*, although a tailed species, the upper ocellus is developed in the lower wing; but it may be added that, in this species, the ocellus at the anal angle is very largely developed, and that there are indications of a second one above the third submedian nervule. In the very closely allied species, *E. mnestheus*, the upper ocellus is absent, and in its place there is a costal red spot, exactly in the same position as the orange spot in *Euphœides troilus*, above adverted to. In *E. constantinus* there is no trace of red in the upper lunules of the under wings.

The possession of a costal ocellus is very rare in the Papilioninæ. In Dr. Staudinger's 'Exotische Schmetterlinge,' where nearly a hundred species of this subfamily are figured, the only

one delineated with the ocellus in question is *Orpheides demoleus*, which, as before stated, is, in my opinion, an archaic form, the larva of which has considerable resemblance to that of *Jasoniades glaucus*.

I am therefore of opinion that the insignificant red suffusion on the first lunule of *Papilio machaon* is the evanescent vestige of an ocellus, in the ancestral form from which this and several other allied species of Papilioninæ have descended, and, as such, is not without its value as a contribution towards the philogeny of the genera above dealt with. I am the more inclined to this view because I find this vestigial marking more often to be found in the females of a species than in the males, the former being, as very well put by Prof. Westwood, the more conservative sex.

Beckenham, March 28, 1891.

THE RE-DEVELOPMENT OF LOST LIMBS IN THE INSECTA.

BY JOHN WATSON.*

It is by no means rare to find instances of the re-development of lost limbs in the Crustacea and spiders; but I have not found any such cases mentioned as occurring amongst the Insecta.

That it is not unusual amongst insects, I have now no doubt, as I have myself had three cases of re-development of limbs and one case of complete cicatrisation (or healing of a wound), which prove that such re-development can and does take place; and at either the larval or pupal stages of the insect's metamorphosis. By re-development I mean, the renewal or growth of a new limb, or part, from the socket or stump of one which has either been pulled off, or amputated. The first case of insect re-development which I recorded, occurred in the larva of *Platysamia cecropia* (a North American silk moth). This was an accidental case, and induced me to experiment, with a view to further my knowledge of this subject.

While rearing the larvæ of this moth a year or two ago, I noticed one, in the fourth age (*i. e.*, one that has moulted three times), had had one of the mesothoracic legs bitten off, or otherwise amputated, probably bitten off by another larva. There was no trace of the femur, except a small piece of the skin, loose and dead. The amputation had only taken place the day I had noticed it, as the surrounding skin was still wet with the extravasated blood, which, at the edges, was already hardening as it dried. I carefully watched this larva through its last larval moult, and on its emergence in the fifth age, I saw that where the leg should have been was a small conical swelling with a black

* A paper read before the Scientific Section of the Manchester Literary and Philosophical Society.

apex. This swelling was slightly paler in colour than the surrounding skin.

At the time this occurred, I was undetermined whether this cone was the commencement of the re-developing leg, or was merely an inflamed area, and the black tip the cicatrix of the amputation; but, as subsequent events have lately proved, I believe it to have been the early development of a new leg.

During the fifth age this swelling (appreciably) did not grow more in proportion than the rest of the body, and the larva spun up its cocoon as usual. An early examination of the pupa revealed the fact that no new leg had then been developed; at all events as far as could be determined by outward examination. In the front of the pupa there was a groove, just as if when the pupal skin was soft the leg had been lifted up and severed off as high and near the body as could be reached. I examined this pupa at various times, to see if I could observe any trace of a new leg, as the pupal skin at the base of this groove was thin, chitinous, and almost transparent. However, I could not see any growth, even as late as two days prior to the insect's emergence, when it was minutely examined by myself and Mr. E. C. Stump, of the Manchester Microscopical Society. The moth emerged, and lo! there was a leg. This I examined, and found it had the usual number of joints, and was freely movable, the only difference being that it was about one-third the size of the corresponding leg on the other side. I exhibited this moth alive, and gave its history, at the Lower Mosley Street Natural History Society, where it attracted considerable attention. When running or walking, it tucked this leg up under the thorax, and used the other five.

The second case to mention is not one of complete re-development, but rather one of complete cicatrization of a wound received by a pupa; cicatrization being the primary commencement before re-development can take place; and as this occurred at a late stage of insect life, it is my excuse for mentioning it here.

I was opening a cocoon of *Antherea mylitta*, when my pen-knife went a little too deep, with the result that I cut into the pupa in a diagonal line across the right antenna cover, and in a line from about the middle of the costal margin of the forewing to near the centre of the discoidal cell. The wound bled freely, so freely indeed that I had no hopes of it living, and not liking to throw it away, but rather wishing to have it as a specimen, I put it away. Examination a day or two later showed that the pupa was still alive, and the wound had stopped bleeding. The blood had hardened over the wound and prevented any more oozing out. The pupa was much shrunk and contracted. Seeing it still alive, I again placed it in my hatching cage, hoping it would still live on and emerge, which it did. This moth emerged a little later than the others, and when examined I found that

the cut wing had totally healed, and cicatrisation of both nervures and membranes had taken place. The right antenna had never developed beyond the cut, and only the stump was left. There is here also a tendency to re-development, inasmuch as the stump of the antenna was split down the shaft for a half of the distance, and what would have been the centre of the shaft had rounded off, and along this side there is a slight trace of the pectination developing. The pectination on the other and normal side of this half of the antenna being as usual, though somewhat distorted; when I saw the moth emerge, I never expected to see its wings develop, and was much surprised to find they did. The mark of the cut and cicatrix can be noticed on the right upper wing, extending from the middle of the costal margin to just the inner side of the eye spot.

The third case was in the instance of the larva of the puss moth. In the fourth age I ligatured with fine silk two legs of this larva, as high against the body as I could; I then severed the legs off with fine scissors. I let the larva feed, and at the next moult I found that two new legs had developed, though not perfect, as the last joint and the hooks were missing; but they had developed to a much further degree than had the larva of my first case—*cecropia*, because they were at a much earlier period of larval life. This larva is now undergoing preparation for microscopical examination and sectioning, with a view to working out the histology of the subject.

The fourth case I now exhibit alive. About November last (1890), I obtained some dragonfly larvæ (*Agrion*, I believe), and ligatured up against the body the left mesothoracic leg of one of them. I then severed it off. This larva I then placed in a tank where there was a good supply of food. Not having previously bred these insects, I began to doubt (as two months elapsed, and no new leg) of its ever re-developing the leg. I thought it had moulted and I had not seen it. But while in Mr. James Hart's possession (who was taking microscopic life out of the tank the larva was in), it moulted and produced the new limb. As far as I can discern there are the usual number of joints, but the hook at the last joint is missing. This leg (as usual in all these cases of re-development) is much inferior in size than its fellow member. I shall endeavour to keep this larva alive, as perhaps, at the next moult, the leg will grow to a larger size, till, with each succeeding moult it becomes larger, and will equal the normal size. I find that the tendency to re-development is much greater at the early ages of insects, and also that the lower groups of the Insecta can re-develop to a greater degree, and at a later stage of their existence than higher members of the Insecta. I am experimenting now with pupæ, and may have some other cases to record later on.

CONCERNING DR. CHAPMAN'S DIVISIONS OF THE
GENUS *ACRONYCTA* (AUCT.).

By A. G. BUTLER. F.L.S., F.Z.S., &c.

IN the 'Entomologist's Record' for May, 1890, vol. i. n. 2, Dr. Chapman proposed three names—*Viminia*, *Cuspidia*, and *Bisulcia*—to be used in a subgeneric sense for groups of *Acronycta*. The types of these subgenera are respectively—

A. rumicis for *Viminia*.

A. psi „ *Cuspidia*.

A. ligustri „ *Bisulcia*.

In the Index to some of the plates these names appear as genera, and consequently they have been adopted as genera by several writers in the 'Entomologist's Record,' as follows:—

<i>Viminia auricoma</i> , Chapman,	Ent. Rec. 1890, p. 29.
„ <i>myrica</i> , „	„ „ 84.
„ <i>menyanthidis</i> , „	„ „ 84.
„ <i>venosa</i> , „	„ „ 84.
„ <i>rumicis</i> , „	„ „ 29.
<i>Cuspidia psi</i> , Tutt,	„ „ 89.
„ <i>tridens</i> , Chapman,	„ „ 29.
„ <i>alni</i> , B. Smith,	„ „ 136.
„ <i>megacephala</i> , H. L. Turner,	„ „ 349.
„ <i>leporina</i> , Hewett,	„ „ 132.
„ <i>aceris</i> , Lewcock & Hanes,	„ „ 167.
<i>Bisulcia ligustri</i> , Chapman,	„ „ 29.

For the above facts I am indebted to my friend Mr. T. D. A. Cockerell, who wishes me to call attention to the fact that, as the genus *Acronycta* was subdivided many years previous to Dr. Chapman's revision, his subgeneric or generic names for the species cannot be admitted as valid.

As long ago as about 1820, Hübner broke up the genus in his 'Verzeichniss bekannter Schmetterlinge,' pp. 201, 202, as follows:—

Hyboma strigosa and *unicornis*.

Triena psi. cuspis, tridens; tritona, and teligera.

Jocheæra alni.

Acronicta leporina and *bradyporina*.

Pharetra auricoma and *menyanthidis*.

Arctomyscis aceris, euphorbiæ, esulæ, euphrasiæ, cyparissiæ.
and *megacephala*.

In my paper on the natural affinities of *Acronycta* (Trans. Ent. Soc. 1879, pp. 313—17) I called attention to Hübner's subdivision of the group, and proposed to adopt his names as genera, based principally upon larval characters.

In Augustus R. Grote's 'New Check-List of North American

Moths,' published in 1882, at pp. 22, 23, the author adopts Hübner's stirps *Apatelæ*, in the singular number, to supersede *Acronycta* (literally *Acronicta*, sic, Ochs.), and subdivides it into groups as follows :—

Triæna,	to include 20 species.		
Jocheæra,	„	2	„
Merolonche,	„	2	„
Acronycta,	„	3	„
Megacronycta,	„	3	„
Apatela,	„	14	„
Lepitoreuma,	„	5	„
Arctomyscis,	„	1	„
Mastiphanes,	„	4	„
Eulonche,	„	3	„

Grote's species, when placed under Hübner's generic names, are nearly allied to the European species referred to these genera by Hübner.

When a genus has already been broken up into about a dozen named groups, it is absurd for a later author to ignore the types of those groups, and to break up the original genus on his own lines without reference to the work already done by his predecessors ; it is, in fact, a wilful burdening of the synonymy with names which will only be used by those unacquainted with the laws of zoological nomenclature, and will consequently be a source of considerable confusion.

Viminia, Chapman, falls before *Pharetra*.

Cuspidia, „ „ *Triæna*.

Bisulcia, „ „ *Arctomyscis*.

Supposing Dr. Chapman to be in accord with those authors who are unconstitutional enough to ignore Hübner ; he cannot, upon any ground whatever, ignore either my paper or the works of Grote ; so that the names proposed by Hübner must stand, even though the authorship of the divisions so named be denied to him, and Butler or Grote be quoted as author of the genera which Hübner indicated.

Natural History Museum, South Kensington.

[I am rejoiced to find that, in the above communication, Mr. Butler has dealt with the proposed renaming of the old divisions of the genus *Acronycta* by Dr. Chapman : not having lately been paying much attention to the Heterocera, I could not take the matter up in a satisfactory manner. I felt that the suppression of the name *Acronycta* could not be justified, as it was at variance with all the canons of zoological nomenclature. With regard to the proper spelling of the name, *Acronicta*, as used by Ochsenheimer, was an error, and was early corrected to *Acronycta*, in accordance with the spelling of the Greek words from which the name is derived.—J. J. WEIR.]

ON THE SO-CALLED "*ERASTRIA*" *VENUSTULA* OF EUROPE.

By A. G. BUTLER, F.L.S., &c.

IN Lederer's revision of the European Noctuæ, which forms the basis of the classification adopted by Staudinger in his Catalogue, *E. venustula* is unhesitatingly referred to *Erastria*. When re-arranging the collection here, I was struck by the dissimilarity from the other forms which this species offered, and, upon examination with an ordinary pocket lens, I at once discovered characters which separate it widely from *Erastria*.

Typical species of *Erastria* (I ignore the Tentamen of Hübner, the publication of which was never proved, and therefore take *E. fasciana*, Linn. = *fuscula*, Schiff., as type) are characterised by a more or less tufted abdomen, although in *E. candidula* the basal tuft alone remains; by porrected palpi with well-exposed terminal joint, and by the radial of the secondaries being emitted just beyond the third median branch, as in *Acontia* and all the genera of the later groups of *Noctuities*.

Lederer's arrangement is very faulty, inasmuch as the species of his group A, characterized by species not having a tufted abdomen, are not typical; moreover *E. candidula*, as already stated, has a tuft on the basal segment of the abdomen, and is also closely related to the North American *E. carneola*, in which the abdomen is very heavily tufted; with the exception of *E. scitula*, which differs in having the second and third median branches of the secondaries emitted from a footstalk, and therefore is not an *Erastria*, and *E. candidula*, which is an *Erastria*, none of the species even resemble the genus.

With regard to *E. venustula*, it has an untufted abdomen, thick upright palpi, with very short terminal joint, and the radial of the secondaries emitted from the centre of the disco-cellular veinlet—a character which at once removes it to the earlier groups of *Noctuities*. According to Lederer the larva would appear to be a semi-looper, and, if this is so, it would be best to place it at the end of the first section immediately preceding the *Eriopidæ*: but I question Lederer's having personally examined the larva, and I should like to know from Mr. Cooper, who has had opportunities of rearing it, whether it at all nearly resembles the larvæ of the species with which it has been wrongly associated.

It now becomes necessary to assign *E. venustula* to a different genus.

In his 'Verzeichniss,' Hübner, at p. 254, included the following species in his genus *Hapalotis*:—*H. furrula*, now referred to *Caradrina*; *H. lupula* and *ravula*, referred to *Bryophila*; *H. fuscula*, *atrata*, and *candidula*, referred to *Erastria*; lastly, *H. venustula*, which, by the process of restriction now adopted for fixing the types of these mixed genera, becomes the type of

Hapalotis. I prefer to adopt Hübner's name, rather than to propose a new one; and those who object to quoting the genus as Hübner's, on the insufficient ground that it is imperfectly characterised, are welcome, so far as I am concerned, to imagine that I am the author of it.

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CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. PERRY COSTE, F.C.S., F.L.S.

(Continued from p. 91.)

V.—THE CHEMICAL ASPECT (*continued*).

H.

THE next colour which we have to consider is green; a very interesting colour, but an exceedingly difficult and perplexing one to deal with. The difficulty is owing to the fact that under the one term of green are included several different colours—different in constitution and behaviour, though broadly similar in appearance. This was already evident from the reactions tabulated on page 251 of the last volume; but since then I have been able to experiment on a number of exotic species, with the result that I have discovered still more variability in the greens. Clearly, then, our first step must be to classify these various greens, and, as a preliminary, I will prefix a list of the fresh specimens recently examined, with a summary of their reactions.

NAME.	COLOUR.	ACID EFFECT.	ALKALI EFFECT.
<i>Papilio codrus</i> ..	Leaf-green	O	Yellow
<i>P. agamemnon</i> ..	Deep green	O (except by HNO ₃)	Whitish
<i>P. polices</i>	Leaf-green	White	White
<i>P. antheus</i>	Pale green	White	Somewhat affected
<i>Limenitis procris</i> .	Sage-green	Dun-grey	Dun-grey
<i>Parthenos gambri-</i> <i>sus</i> , below ..	Sage-green	Dun-brown	Dun-brown
<i>Parthenos gambri-</i> <i>sus</i> , above ..	Metallic green....	Purplish bronze ..	Blackish
<i>Eronia argia</i>	Very pale bluish grn	White*	White
<i>Hesperia</i> sp.?	Dark metallic green	Blackish or O	Purplish bronze
<i>Urania fulgens</i> ..	Metallic bronze-grn	Red or violet bronze	

Let us, first of all, adopt the same course that was followed in treating of yellow and chestnut, and arrange the various greens in different groups, according as they behave when tested with the reagents. We shall find it necessary to form—at least provisionally—three groups, as shown in the following tabulation:—

* Dissolution not certain; so little pigment in the wing to start with.

Physical colours. Became bronze.	Physical (?). Became bronze-brown, &c.	Pigment colours. Dissolve, leaving white wing; but, in some cases, wing is yellowed.
<i>Parthenos gambrisius</i> , above <i>Hesperia</i> sp.? <i>Urania fulgens</i>	<i>Argynnis</i> <i>Limenitis procris</i> <i>Parthenos gambrisius</i> , below <i>Ino statices</i> <i>I. globulariæ</i> <i>Thecla rubi</i>	<i>Papilio codrus</i> <i>P. agamemnon</i> <i>P. policles</i> <i>P. antheus</i> (<i>Eronia argia</i>) <i>Halias prasinana</i> <i>Moma orion</i> <i>Dichonia aprilina</i> <i>Larentia viridaria</i> <i>Nemoria vernaria</i> <i>Hemithea strigata</i> <i>Metrocampa margaritaria</i> <i>Tortrix viridana</i> <i>Cidaria miata</i> } (?) <i>C. psittacata</i> }

It may be noticed that in this table I have ignored one species, *E. cardamines*, the green of which, as shown in my original tables,* is invariably turned black by all reagents. The omission here of so unique a species may cause surprise; and, indeed, were the colour of this really a true green, which green becomes black by the action of my reagents, we should certainly have a most interesting example to deal with. But, as a matter of fact, the green of this species cannot be rightly reckoned as green at all. My experiments have fully convinced me that Mr. Cockerell was quite right in the statement made some time since, in his article on Variation,† that the green of *cardamines* is apparent only, being merely a mixture of black and yellow. This entirely accords with my experiments: the slight amount of yellow is rapidly dissolved and the black left standing only. Therefore, although this wing, previously to all appearance green, remains black, we cannot reckon that a green has been changed to black.

Now, in discussing the character of green, the first point to be noticed is that whereas in red we had indubitably a pigment colour only, and in yellow and chestnut (yellow especially) had no *certain* evidence of any "physical colour," here, in green, on the contrary, we have indubitably *both* physical and pigmental colours to deal with, as well as a class of colours that are very probably physical, though it is scarcely possible to speak decidedly about them at present.

Let us first dispose of the physical greens, of which we have, undoubtedly, examples in *Urania fulgens*, *Parthenos gambrisius*, and the *Hesperia* sp. All of these are *metallic* colours, and, by a practised eye, can be instantly and with certainty detected as "physical" colours. I think that I may safely venture to lay

* Entom. xxiii. 252.

† Entom. xxii.

down the rule that when a patch of colour visibly consists not of a *continuous* mass, but of a number of isolated distinct spots of colour, that colour is certainly *physical*. So far as my experience goes, this kind of appearance is found only in the metallic greens* and the blues; among the latter *Papilio machaon* affords an excellent illustration. I hope that my description of the kind of effect to which I wish to draw attention is intelligible; but if not, I will ask any of my readers to carefully examine the blue markings on *P. machaon*, after doing which I think that they will no longer be under any doubt.

Now, as to the reactions of such "physical" blues and greens, it must not be hastily assumed that because such colours are not pigmental, therefore they will be totally unaffected by any reagents. This would be erroneous. Of course there can be no dissolution effect, neither can there be any "reversible" effect, such as the reds display. But it must be remembered that, since the colour in such cases depends on the molecular structure of the surface, any temporary or permanent alteration of this surface may be expected to temporarily or permanently alter the colour. It would be strange indeed, if a thorough soaking with even any indifferent liquid did not temporarily affect the molecular structure, and so alter its effect on the light rays; much more might we anticipate that any such powerful and destructive reagents as caustic potash, or nitric acid, would permanently alter the surface structure, and so lead to a coloric alteration. And this is just what we do find in many cases, as will more clearly appear after the phenomena of blue species have been discussed. Accordingly, one of three things may happen when we experiment on these "physical" colours:—(1) They may be unaffected; or (2) the colour may disappear, but gradually return on drying;† or (3) the colour may be permanently either altered to, usually, another metallic-looking colour, or permanently dulled or destroyed.

Returning now to the three green species just referred to (*U. fulgens*, *P. gambrisius*, and the *Hesperia*), we find that the greens are changed to some sort of a *bronze*—a reaction which is perfectly intelligible in the case of a physical colour. Since further examples of such changes will be found among the blues, we need linger no longer to consider them here; but I may observe that the green of *Parthenos gambrisius* (upper surface) suffered unusually for a colour of this class, since the final effect of most of the reagents was to destroy all lustre and colour altogether, and I found no return after several days' standing. The "physical" greens seems to possess by no means so "strong a constitution" as the physical blues.

* I ought, however, to add, that with some of these metallic colours it is a toss up whether to call them green or yellow; all depends on the angle at which the light falls on them.

† This is very marked in *P. machaon*.

In column 2 we have an exceedingly interesting and equally puzzling group—one, too, that has caused me not a little mental exertation. Originally, I had split this into two groups, the second of which possessed one solitary representative, *T. rubi*; but further reflection and experiment have led me to class *T. rubi* with the other species, as in the present arrangement. The difficulty with this group is to obtain some decided evidence that shall justify us in stating certainly that these greens are or are not “physical” colours. The facts that I have found no solution of pigment (indeed, the change from green to brown is so instantaneous as to well nigh preclude any supposition of solution taking place), and have no evidence of a “reversible” effect comparable with that in the case of red, both tell against the existence of a green pigment in these instances. But this evidence is not conclusive. Considerably more conclusive is the fact that in *Limenitis procris* I have been able to effect the change from green to brown (or rather, in this case, a sort of dun-grey) by simple water; and this change was permanent. In *T. rubi*, too, it is possible to abolish the green colour by water; but the colour rapidly returns. In *Argynnis* I have been less successful in inducing this change by water only; but in both these two last species I have effected it by alcohol. In the case of *rubi* the green returned very quickly, as soon as the wing was dried in fact. In *Argynnis* the return was less rapid. I must point out that the argument from the action of alcohol must be applied with considerable reservation.

Summing up the case of group 2, it seems to me that we may lay down the following conclusions:—That the green of *Parthenos gambrisius* is physical; this is strongly supported by the undoubtedly physical character of the green on the upper surface of that species. The similar green of *Limenitis procris** is also physical; and the green of *Ino statice* and *globularia* is, in all probability, of the same nature. As to *T. rubi* and the *Argynnis* species, the evidence is strongly in favour of the former being of a physical green; while as to the latter, the evidence, so far as it goes, favours the same supposition, but is less strong perhaps.†

Turning now to group 3,—the most interesting of all, since here we have clearly pigment colours in evidence,—we shall find a brief notice, in addition to the facts published already in the tables,‡ sufficient. Taking, first, the English species, which in all cases, except the ambiguous one of *Cidaria miata* and *psittacata*, dissolve, leaving a white wing, the case is evidently exactly com-

* This derives additional support from the fact that in *L. sibylla* we have this colour represented by a physical pale blue. See next subsection.

† I shall be greatly obliged to any correspondents who will inform me, either by letter or through the pages of the ‘Entomologist,’ of any species marked with apparently the same green as *rubi* or *argynnis*; and also of any varieties (if any such be known) of these species—varieties, I mean, so far as concerns the green.

‡ Entom. xxiii. 252.

parable, so far, with the behaviour of the soluble yellows and chestnuts; and it is exceedingly interesting that we should find the *same* green pigment in such very divergent groups as Noctuæ, Geometræ, and Tortrices; whilst the evidence of the exotic Papilionidæ extends this statement to the Rhopalocera. As to the case of *Cidaria*, I am inclined to think it not impossible (though I am not sure about this point) that the exception may be no more real than is the behaviour of *Vanessa io* among the chestnuts; I mean that the green of *Cidaria* may be identical with that of the remaining species, but developed on a grey or brown ground wing instead of on a white.* If this supposition be correct, these two species are of especial interest.

Now, any reader who will turn to the original tables of reactions,† published last August, will observe that in the case of *Halias prasinana* I especially emphasised the somewhat startling phenomenon that one reagent (ammonia) turned the green to a *prominent yellow*; not a pale, dubious yellow, but a genuine "ochre-yellow." This phenomenon is not, moreover, entirely so isolated as might appear at first sight; for in the case both of *M. orion* and *D. aprilina* a faint yellowish tint was produced by nitric acid. Neither are parallel instances wanting among the Geometræ; for in both *H. strigata* and *M. margaritaria* a yellowish tint was produced, whilst it is noted that *N. vernaria*, under the influence of acetic acid, changed from green to white, "passing through a phase with pale yellow streak."

Turn we now for a moment to the Papilionidæ. When I first saw the beautiful leaf-green of *P. codrus*, *agamemnon*, &c., I concluded it pretty certainly to be a pigment colour. But the earlier experiments did not seem to bear out this view: for instance, both these species were unaffected by the acids; but the other two species noted were more amenable; and in all cases the greens were acted on by potassic and sodic hydrates.‡ I concluded, therefore, that the green was identical with that of our English Heterocera, already referred to, although of a somewhat more stable or less soluble character. But there is yet stronger evidence; for, as shown above, the effect of the alkalis was to change the green of *codrus* into a *yellow*, which was permanent when looked at five days afterwards. In the case, too, of *policenes*, although the wing was not yellowed, yet the solution of the dissolved pigment was; or, to quote the entry made in my note-book, it "dissolved as yellowish." We may, therefore, very safely consider, I think, that the Papilionidæ green is practically the same as that of the other species.

Now let us revert to the "yellowing" phenomenon: how is this to be interpreted? The facts, so far as they go, appear to

* Entom. xxiii. 340.

† Entom. xxiii. 252.

‡ With this *cf.* the fact that chestnut seems in many cases more soluble in alkalis than in acids.

me to point very significantly to one conclusion, that *green has been evolved from yellow* similarly as red has. I am, however, anxious not to insist upon this interpretation at present, since the data to hand are far too scanty for a definite decision to be made; but it is certainly justifiable to point out the probability of this view. For the rest, I can only wait until, by experimenting on a large number of green species, further data shall have been accumulated. I may add that, in forming this opinion as to the relations of green and yellow, I have relied not simply upon the fact that in several cases green has been changed into a permanent yellow, but also, especially, on the apparent evidence afforded by various species of yellow being a transition stage in the course of the dissolution; just as, for example, the red of *Delias* and the orange-red of *G. cleopatra* are first changed to yellow, and then that yellow dissolved.

This much must serve for green; and now we pass to the last colour to be considered, *viz.*, blue.

(To be continued).

A PRELIMINARY LIST OF THE INSECT-FAUNA OF MIDDLESEX.

COMPILED BY T. D. A. COCKERELL.

(Continued from p. 97).

ADDITIONAL records have been obtained from the following sources:—

(23.) Rev. J. E. Tarbat. A MS. list of Lepidoptera taken mostly at Brook Green, Hammersmith, between the years 1881 to 1883 inclusive.

(24.) A. W. Mera. A MS. list of Lepidoptera taken in Middlesex, chiefly between the years 1862 and 1879.

(25.) Canon Fowler. 'Coleoptera of the British Islands.' Records quoted from this work are for the most part credited to its author, as the name of the collector is not often mentioned therein. It would be better, no doubt, to quote the original sources of information from which Canon Fowler got his records, most of which have probably been published before; but this would involve more bibliographical research than the present recorder has time for.

Two additions are so interesting that they may be noticed now. Mr. Mera gives me records of *Leucophasia sinapis*, L., "in a lane near Acton, one specimen taken by a friend"; and *Stauropus fagi*, L., one taken in his garden at Hammersmith about 1863. Additional records for several of the rare species have also been received, and will be published later on.

It has happened not unfrequently that the same locality for

a species has been sent to me by two observers: in such cases I have usually only quoted the name of one of them. In Entom. 1888, pp. 247, 248, Mr. J. W. Tutt records several species and varieties of Noctuæ from "London." These are omitted from the present list, as I learn from Mr. Tutt that the records refer to parts of London outside Middlesex.

LEPIDOPTERA.

Noctuidæ, subf. *Bryophilinæ*.*

Bryophila perla, Fb., Hall Road, St. John's Wood; Kingsbury; Harrow Road, Willesden (*Godwin*); Mill Hill, at sugar (*South*); Isleworth (*Fenn*); Bedford Park (*L. M. Cockerell*); Highgate (*Shepherd*); frequent on walls about South Hampstead (*Watts*); Hammersmith (*Tarbat*).

Subf. *Bombycoinæ*.

Demas coryli, L., Oxhey Lane (*Rowland-Brown*).

Acronycta psi, L.,† Regent's Park; St. John's Wood (*Godwin*); Mill Hill (*South*); Isleworth (*Fenn*); Ealing (*Ckll.*); Bedford Park (*Miss E. Sharpe*); Highgate (*Shepherd*); Hammersmith (*Mera*); common, larvæ on birch (*Watts*); Chiswick, larvæ on fruit trees, including medlar and quince (*Sich*); Bayswater (*Chitty*); Clapton (*Bacot*); Dalston (*Prout*). *A. tridens*, Schiff., Highgate (*Shepherd*). *A. leporina*, L., larvæ beaten from birch at Bishop's Wood, Hampstead (*Godwin*); S. Kensington (*Pratt*). *A. aceris*, L., Regent's Park; St. John's Wood (*Godwin*); Mill Hill, at rest on ash (*South*); Bedford Park, a larva in Woodstock Road (*Ckll.*); Highgate (*Shepherd*); Hammersmith (*Mera*); Hampstead, larvæ on sycamore (*Watts*); Chiswick, at rest on trunk of apple tree, larva on palings near horse-chestnut trees, pupa on trunk of same (*Sich*); Clapton (*Bacot*); Dalston (*Prout*); S. Kensington (*Pratt*). *A. megacephala*, Fb., Regent's Park; St. John's Wood (*Godwin*); Mill Hill (*South*); Bedford Park, larva on poplar (*Ckll.*); Tufnell Park (*Shepherd*); Hammersmith (*Mera*); South Hampstead (*Watts*); Chiswick, larva on poplar and willow (*Sich*); South Kensington (*Chitty*); Clapton (*Bacot*); Dalston (*Prout*). *A. alni*, L., doubtfully quoted from Bishop's Wood (*Godwin*). *A. rumicis*, L., Hampstead, *olim* (*Godwin*); Mill Hill, at sugar (*South*).

Diloba cæruleocephala, L., generally distributed (*Godwin*); Mill Hill, larvæ very common on hedges (*South*); Old Oak Common (*Mera*); Harefield (*Wall*).

* Probably the arrangement of the Noctuid moths usually adopted in this country will need modification. I here reduce most of our "families" to sub-families, which is certainly the highest rank they deserve. Grote, in his recent check-list, treats similar divisions merely as tribes.

† Dr. Chapman has, I think with sufficient reason, split *Acronycta* into three genera or subgenera (Ent. Rec. 1890), but, as I learn from Mr. Butler, the names he has proposed for them will not any of them stand as valid.

Subf. *Leucaniinae*.*

Leucania† *conigera*, Fb., Clutterhouse Lane; Cricklewood; Hampstead; Old Oak Common (*Godwin*); Mill Hill (*South*); Harefield (*Wall*). *L. conigera* ab. β, Tutt, Clatter House Lane (*Entom.* 1878, p. 169). *L. vitellina*, Hb., Finchley (*W. T. Sturt*, *Ent. Mo. Mag.* xxiii. p. 110). *L. lithargyria*, Esp., Clutterhouse Lane; Hampstead; Old Oak Common (*Godwin*); Mill Hill, at sugar and bred from larvæ (*South*); Highgate (*Shepherd*); Chiswick (*Sich*); Harefield (*Wall*). *L. comma*, L., Mill Hill (*South*); Harefield, frequent (*Wall*). *L. straminea*, Tr., Hammersmith, olim (*Newman*, 'Brit. Moths,' p. 266). *L. impura*, Hb., Clutterhouse Lane; Hampstead; Old Oak Common (*Godwin*); Mill Hill (*South*); Bedford Park (*J. W. Horsley* fide *Fenn*); Finchley (*Shepherd*); Harefield (*Wall*); Clapton (*Bacot*). *L. pallens*, L., Clutterhouse Lane; Hampstead; Old Oak Common (*Godwin*); Mill Hill (*South*); Finchley (*Shepherd*); Harefield (*Wall*).

Senta maritima, Tausch.

Tapinostola fulva, Hb., Bishop's Wood, Hampstead (*Godwin*).

Nonagria arundinis, Fb., Willesden; Old Oak Common; Hampstead Heath; Hammersmith (*Godwin*); Mill Hill, at sugar (*South*). *N. geminipuncta*, Hatch.,† Hammersmith Marshes (*Newman*); *N. lutos*a, Hb.,§ Hammersmith (*Mera*).

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—The Annual Exhibition of this Society, held on the 15th and 16th of April last, was an undoubted success. The general arrangements were excellent, and the exhibits were very pleasingly varied, and represented all branches of Natural History. Among other important exhibits in the Entomological Section was one, by Mr. Billups, of Ichneumonidæ bred by members of the Society from various species of Lepidoptera during the past four years. In all cases the imago of the lepidopteron upon whose larva the ichneumon was parasitic was shown, and in many instances the larva also. Mr. Leech's contribution, which showed the geographical distribution and local variation of several species of Lepidoptera found in Britain, attracted considerable attention, as also did Mr. Adkin's geographical arrangement of British butterflies, and his very fine collection of *Triphana*æ. Another specially interesting exhibit was the collection of Canadian Lepidoptera presented to the Society by Messrs. A. and L. Gibb,

* This subfamily is equivalent to Grote's tribe Nonagriini.

† Mr. Grote uses the older name *Heliophila*, Hbn., in place of *Leucania*.

‡ *N. geminipuncta* is said by Mr. Butler to be congeneric with *Tapinostola fulva*.

§ *N.* (or *Calamia*) *lutos*a and *N. arundinis* are referred by Mr. Butler to *Ommatostola*, Grote.

and arranged by Mr. W. West, the curator. There were several instructive cases of life-histories of Lepidoptera, lent by Messrs. Croker, McArthur, Quail, &c.; and of insects injurious to farm crops, by Mr. S. L. Mosley. The variation of Lepidoptera in Britain was illustrated by several exhibitors, among whom were Messrs. C. S. Gregson, T. W. Hall, J. W. Tutt, and S. Webb; some of the aberrations of *Vanessa urtica* and *Abraxas grossulariata*, shown by the last-named gentleman, were extraordinary, as also was a black specimen of *Papilio machaon* exhibited by Mr. Leech. Examples of mimicry among Lepidoptera were exhibited by Prof. Stuart. Mr. R. McLachlan exhibited British Trichoptera (caddis-flies), with larval cases. Homoptera were shown by Messrs. Billups and West, and there were loans of Coleoptera from Messrs. C. H. Goodman, W. Manger, G. A. Lewcock, and others. Three lantern exhibitions were given on each evening; and Mr. F. Enock's lecture on "The Wonders of Insect Life," illustrated by micro-photo-slides, was an intellectual treat thoroughly enjoyed by all.—ED.

COCCINELLIDÆ EATEN BY BLACK-HEADED GULLS.—On several occasions, during the last three years, I have frequently seen a number of black-headed gulls flying about over the tops of some tall trees in a small plantation near the river Mersey. They attracted my attention more especially by their curious flight, which was very like that of a company of swallows chasing their prey; by this I guessed that they were capturing insects on the wing, but to be quite sure of this, one of the birds was shot, and as it fell to the ground it became suspended by its legs to the lower branches of a tree, when it immediately cast up a number of specimens of a *Coccinella*, numbering between thirty and forty individuals. In company with the gulls there were frequently a number of starlings, also flying as if chasing insects, but whether they were feeding upon Coccinellidæ or not I am unable to state, as I have not examined their stomachs. The gulls only frequent this spot on sunshiny days during flood-tide, apparently for the purpose of obtaining insects and nothing more. It is very curious that the Coccinellidæ should fly so high, and much more so for the gulls to feed upon them; they are the last birds that one would suspect of doing this. I regret that I am unable to give the name of the *Coccinella*, as at the time I attached no special value to my observation, but since reading my son's note (*ante* p. 100), I thought this might prove of interest.—R. NEWSTEAD, Sen.; Ince, near Chester, April 9, 1891.

BIRDS FEEDING ON NAUSEOUS INSECTS.—In 1875 a large whitethorn hedge between Shoreham and Lancing was being devoured by larvæ of *Liparis chrysorrhæa*. Four cuckoos that were flying in and out of the hedge fell to the gun of Mr. F. Trangmar. Thinking the birds had been feeding on the larvæ, we examined the contents of their stomachs; but although we could find no trace of larvæ amongst the almost completely digested matter, we observed the remains of several wing-cases of different Coleoptera, and I distinctly remember finding, in two of the birds, elytra of the common ladybird.—H. MCARTHUR; 35, Averill Street, Fulham Palace Road, W.

AN ENTOMOLOGICAL MYTH.—In all our lists of British Lepidoptera occurs the name of *Cucullia scrophulariæ*, Hüb. It has been recorded from Bloxworth, but the Rev. O. P. Cambridge now writes, "I doubt whether my Bloxworth examples are any more than *C. verbasci*." I believe myself that

there is no such species in Britain, and that specimens of both *C. verbasci* and *C. lychnitis* are doing duty in our cabinets as *C. scrophulariæ*. If we turn to the 'Lepidoptera Britannica,' we see that Haworth's opinion is this:—"As the great lepidopterist Hübner gives the water-betony moth as a distinct species from that of the mullein, and figures both, it is also here enumerated, as I possess English specimens of both and have seen others. But, unless they differ more in the larva state than they do in the winged, which is almost a constant characteristic in this section, I must still conceive they are not distinct, but very slight variations only. The chief difference is the paler colour of *scrophulariæ*, whose upper wings, especially in the broad plaga, are of an ochreous colour, as figured by Hübner, while those of *verbasci* are nearly white in the same part." Now, may I ask, will not this description do for *C. lychnitis*, Ramb., which species was apparently unknown to Haworth? A mistake which has often been made is that larvæ of a *Cucullia*, feeding on figwort, are those of *scrophulariæ*; for it must be borne in mind that the larvæ of *verbasci* will also feed on figwort as well as on mullein. Stainton, in his 'Manual,' gives a description of the larva of *scrophulariæ*, copied from Rambur. May I ask, Has any such larva been found in Britain?—C. W. DALE; Glanvilles Wootton, March 20, 1891.

ASSEMBLING OF BREPHOS PARTHENIAS. — In answer to Mr. Perry Coste's enquiry with regard to assembling, it may be interesting to record my experiences of to-day. At 2 p.m., the afternoon being warm and sunny, I armed myself with the three bottom joints of a good stout fishing-rod, and wended my way to some woods at Warley where I take *B. parthenias* regularly every year. On arriving at the scene of operations, I affixed my net to the fishing-rod, which was some ten feet high, and wandered about in search of the orange underwing. For a long time I was unsuccessful, as the wind was rather high, my net unwieldy, and there were very few *parthenias* about. At last I succeeded in catching a male flying low, and shortly afterwards a large, dark, freshly emerged female, flying about five feet from the ground round a birch bush. No sooner was she in my net than all at once she was surrounded by five males, which seemed to rise as if by magic from two neighbouring birch trees. Three of these were promptly in my net and soon transferred to boxes. The female I left in my net, hoisted on high, and for a considerable time afterwards males kept coming up, both with the wind and against it. The would-be captor of *parthenias* should select a clearing in a birch-wood, where he will have plenty of room to make the somewhat wild strokes necessary to catch this high-flying species. Fresh specimens rarely fly at a lower altitude than ten or twelve feet.—(Rev.) GILBERT H. RAYNOR; Victoria House, Brentwood, April 6, 1891.

ATTACUS ATLAS (GIANT RACE).—I wish to record my success in rearing one of these somewhat delicate insects through all its stages—a success which culminated in the emergence, a few days ago, of a fine female imago, measuring within a shade of ten inches across. Of the three larvæ which hatched from the half-dozen ova that I obtained last summer, one died on arrival, having hatched in the post; another died after attaining about half its growth; but the third resulted in the above-mentioned success. The larvæ selected oak for their food during their first and a considerable portion of their second stage, but subsequently, until the death of one and and pupation of the other, plum alone was eaten. They were kept under

a glass shade in a hothouse, but there was practically no artificial heat except a moderate temperature at night. The larva that attained its full growth fed almost continuously, and this, coupled with the size of one of the parents, led me to expect even a larger imago. Seven weeks was about the duration of the larva stage, and it took about a similar period to "force" the pupa; *Attacus orizaba*, under the same conditions, taking two weeks less.—H. J. WHITE; Frogmore Lodge, St. Albans.

HYBERNIA DEFOLIARIA IN FEBRUARY.—During the first week of last February, I met with eight specimens of the above insect, at gas lamps. Contrary to Mr. Raynor's experience (*Entom.* 99), nearly all these were in fine condition (though curiously undersized), and I can hardly believe that they were other than freshly emerged specimens, and not hibernated ones from the previous October or November. Though working the gas lamps frequently the previous autumn, I only record three examples of this species. As an instance of the wide time-range of emergence that obtains in the genus *Hybernia*, I may mention that *H. progemmaria* abounded at the gas-lamps here at the end of January and during February of last year, and that on April 17th of the same year, I netted a specimen of this species near Dawlish, S. Devon.—R. M. PRIDEAUX; 28, Berkeley Square, Bristol, April 3, 1891.

I venture to think that the specimens of this moth taken by the Rev. Gilbert H. Raynor, in February last, were insects the emergence of which from the pupa was retarded by the long frost which set in at the end of last year. This was certainly the case with a male of this species which I found in my breeding cage in the beginning of February, and probably also with a female, but as the latter was dead when found, it might have emerged in November and escaped my notice, though I think this unlikely. Mr. T. B. Jefferys' note (*Entom.* 100) on *Pacilocampa populi* supports my view. Even winter insects require a warm day to induce them to leave the pupa.—A. J. CHITTY; 33, Queen's Gate Gardens, S.W.

LATE APPEARANCE OF HYBERNIA DEFOLIARIA.—I took a few larvæ of this species last year; two or three imagines came out at the usual time, and I was much surprised to find that a male came out on 28th December. I thought this was very late for the species, but another male (dark variety) came out on 30th January; a female on the 3rd February; and a male (dark variety) on 13th February. My breeding-cage is situated out of doors, but sheltered from the north and north-east winds, and it gets the benefit of whatever sunshine there may be.—A. BACOT; 35, Oakfield Road, Clapton, N.E., April 9, 1891.

HYBERNATED SPECIMEN OF GEOTRUPES TYPHEUS NEAR MANCHESTER.—While hunting for Coleoptera on the 27th of last month, in Dunham Park, Bowdon, near this city, I turned out of a bore a fine hibernating specimen of *Geotrupes typhaeus*. According to Mr. Fowler's work, 'Descriptive British Coleoptera,' Dunham Park is, with the exception of Liverpool, the only place in the northern counties where this species has been observed, although found locally in southern counties. Perhaps this note may interest some northern entomologists.—WM. MCKAY; 79, Bishop Street, Moss Side, Manchester, April, 1891.

NOTES ON SOME EARLY SPECIES OF LEPIDOPTERA.—Since the first of the month of March I have been several times to Richmond Park, to

obtain *Nyssia hispidaria*, but have not been fortunate enough to meet with it, and to the present time I have only heard of about eight having been taken. *Phigalia pedaria*, *Hybernia leucophearia*, *Anisopteryx æscularia*, occurred sparingly on the days when I was able to visit the park, but several friends have taken all three species there commonly since the end of February. On the 15th March, *Taniocampa gothica* began to emerge, in a cage that has been in the garden during the whole of the winter; the pupæ were then brought into a warm room, and since then have emerged very freely, averaging about half a dozen a day. I am also breeding *Eupithecia minutata*, *Lobophora viretata*, and *Hemerophila abruptaria*, all of which have been kept in a room where there is a fire every day.—H. W. BARKER; 83, Brayard's Road, Peckham, S.E., March 25, 1891.

NOTES FROM THE WYE VALLEY BELOW BUILTH.—I found the year 1890, on the whole, a very bad one for Lepidoptera. I, however, succeeded in adding some moths to the list I am making of the Lepidoptera of this neighbourhood. On the 22nd of May I took at light two beautiful specimens of *Agrotis cinerea*, which is, I believe, considered a good insect anywhere, and one I hardly expected to get here, as I can hear of no other instance of its capture anywhere in the district. In August I took also at light *Cleora glabraria*. I found sugar almost a complete failure, and took very few moths at it. Larvæ in the spring and early summer were very plentiful on the oaks, but in the autumn they were singularly scarce. Butterflies were much fewer than usual, the commonest were, I think, *Polyommatus phlæas* and *Lycæna icarus*. The Vanessidæ were, on the contrary, very scarce. I hardly saw a specimen of *V. atalanta* or *V. io*, and not a single *V. cardui*, all of which, especially the first two, are generally very common here.—JOHN WILLIAMS VAUGHAN, Jun.; The Skreen, Radnorshire, Erwood, R.S.O.

LATE APPEARANCE OF EUCHLOE CARDAMINES.—On various occasions notes have appeared in the 'Entomologist' of unusually late appearances of *Euchloë cardamines*. It may, therefore, be of interest to state that I saw a specimen (male) on July 15th last, at Mürren, near Lauterbrunn in Switzerland. It may possibly be worth recording, also, that during a tour of between two and three weeks, in which time I walked over between 200 and 300 miles of that country, I saw but one specimen of *Gonopteryx rhamni*, and that between Thun and Interlaken.—F. H. PERRY COSTE; Ravenshoe, Burnt Ash, March 4, 1891.

PIERIS RAPE.—On the 24th March last, a freshly emerged specimen of *Pieris rapæ* was taken in the kitchen at the Bridge House Hotel, London. Although this date is late as compared with the recently recorded specimens (Entom. xxiv. 77, 99), the position in which the insect was found appears to me to afford a clue to their origin. What is more probable than that the larva from which this butterfly was reared should have been introduced into the kitchen in the autumn with the cabbages that would, in the ordinary course of things, be brought into such a place for culinary purposes, and being full fed seek some secluded corner in which to pupate; and its premature emergence be brought about by the warmth of the apartment? In like manner, larvæ that may have wandered into greenhouses to undergo pupation would, by reason of the artificial warmth applied in the early months of the year to force the plants into blossom, be also forced

into early emergence, and on the first opportunity escape into the open.
—ROBT. ADKIN; Lewisham.

EUPITHECIA ALBIPUNCTATA VAR. *ANGELICATA*.—I have bred a number of this variety of *E. albipunctata*, along with the type, from larvæ taken at Bishop's Wood last September. Some years ago I bred one or two a season, but never in such large proportion to the type as this year.—GEO. JACKSON; York, April 21, 1891.

CLOANTHA SOLIDAGINIS IN INVERNESS-SHIRE.—Among the few specimens taken by me last season in Inverness-shire (Entom. 74), I omitted one specimen of *Cloantha solidaginis*, which at the time I had noted down as *Acronycta menyanthidis*; not, however, being sure of this, I sent my capture to Mr. Tutt, who kindly identified it for me. Newman says of this species, "Exceedingly local; once taken at Torquay, its favourite counties being Lancashire, Cheshire, and Yorkshire."—D. H. S. STEUART; Royal College of Science, Kensington, W., April 9, 1891.

"A COLD PROSPECT."—Under this head the 'Chester Courant' for April 1st, 1891, has the following, which may be interesting to entomologists:—"Many people have an idea that after the severe winter we have had we may look for a warm summer, but according to M. Lancaster, of the Brussels Observatory, who has been engaged in studying the statistics of the weather in Europe during the present century, a cold winter has never in that period been followed by a hot summer. On the contrary, in most cases the ensuing summer has been colder than usual." So far the entomological outlook—in the Chester district at any rate—is a poor one, and coincides too closely with the dismal forebodings of the quoted paragraph. March has been exceptionally cold, and April is, so far, both cold and sunless. Amongst preponderating east winds, my notes very naturally record very little Entomology.—J. ARKLE; Chester, April 8, 1891.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—April 1st, 1891.—Professor R. Meldola, F.R.S., Vice-President, in the chair. Mr. G. A. Booth, of Grange-over-Sands, North Lancashire; and Mr. W. Manger, of New Cross, S.E., were elected Fellows of the Society. Capt. H. J. Elwes showed a small but very interesting collection of butterflies from Laggan Alberta, N.W. Territory of Canada, taken by Mr. Bean at high elevations in the Rocky Mountains. Amongst them was *Colias elis*, Streck., which seemed to be very close to, if not identical with, *C. hecla* of Europe; *Argynnis alberta*, W. H. Edw.; and *Chionobas subhyalina*, W. H. Edw. The resemblance between the butterflies of this locality and those found on the Fells of Lapland was very striking, some of the species being identical, and others very closely allied. Capt. Elwes said that it was another proof, if one were wanted, of the uniformity of the butterflies found throughout the boreal region in the Old and New Worlds. Mr. G. C. Champion exhibited several insects recently received from Mr. J. J. Walker, from Hobart, Tasmania. The collection included a curious species of Forficulidæ, with asymmetrical forceps, from the summit of Mount Wellington; two

mimetic species of *Ædemeridæ* belonging to the genus *Pseudolyceus*, Guér., and the corresponding *Lycidæ*, which were found with them; also specimens of both sexes of *Lamprina rutilans*, Er. Mr. N. M. Richardson exhibited a specimen of *Zygæna filipendulæ* with five wings; a second specimen of the same species with the middle legs on the right side much dwarfed; four specimens of *Gelechia ocellatella*, including a pink variety, bred from *Beta maritima*; four specimens of *Tinea subtilella*, a species new to Britain, taken last August in the Isle of Portland; also specimens of *Nepticula auromarginella*, a species new to Britain, bred from larvæ taken near Weymouth on bramble. Dr. Sharp and Mr. M'Lachlan commented on the structural peculiarities of the two specimens of *Zygæna*. Mr. C. Fenn exhibited a long series of *Taniocampa incerta*; they were all bred from ova laid by the same female, and many of them were of an abnormally pale colour. Mr. Fenn said that, according to Mr. Merrifield's theory, these pale specimens, in consequence of the temperature to which they had been subjected in the pupal state, ought to have been very dark. Mr. Jenner Weir, referring to the pale specimens, said he had never before seen any of so light a colour. Mr. W. Dannatt exhibited a butterfly belonging to the genus *Crenis*, recently received from the Lower Congo. He said he believed the species was *Crenis benguelæ*. Mr. G. A. J. Rothney sent for exhibition several specimens of an ant (*Sima rufo-nigra*), from Bengal, together with specimens of a small sand-wasp (*Rhinopsis ruficornis*) and a spider (*Salticus*), both of which closely mimicked the ant. It was stated that all the specimens exhibited had lately been received from Mr. R. C. Wroughton, Conservator of Forests, Poona. Mr. Rothney also communicated a short paper on the subject of these ants and the mimicking sand-wasps and spiders, entitled "Further notes on Indian Ants." Mr. G. C. Champion read a paper entitled "A list of the Heteromorous Coleoptera collected by Mr. J. J. Walker, R.N., in the neighbourhood of Gibraltar, with descriptions of four new species." At the conclusion of the meeting a discussion ensued, in which Mr. Kirby, Capt. Elwes, Mr. M'Lachlan, Mr. Jenner Weir, Dr. Sharp, and Mr. Crowley took part.—H. Goss, *Hon. Sec.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.
—March 26th, 1891. Mr. W. H. Tugwell, President, in the chair. Mr. Skinner, of Putney, was elected a member. Mr. C. Fenn exhibited a long series of *Taniocampa incerta*, Hufn., bred from ova obtained from a female captured at Lee, Kent, and remarked that the forms were mostly of very pale gray or brownish tints, banded with dark grey and purple, and showed a strong tendency towards the form of the female. Out of nearly 100 that were bred, two-thirds followed the type. The pupæ had been exposed to the intense frost of the winter, and the moths emerged within a fortnight of the frost breaking up; and in his opinion the preponderance of the pale forms did not corroborate Mr. Merrifield's idea that cold darkened the colour; the black form of the species occurred at Lee. Mr. Tugwell, referring to Mr. Fenn's exhibit, expressed an opinion that the brood did not always follow the form of the parent moth, and instanced *Acidalia aversata*, of which he had bred forms entirely distinct from the female, but, in reply to Mr. South, said he did not see the male parent. Mr. South remarked that in breeding Lepidoptera he invariably found the brood followed either the male or female parent, or resembled both. Mr. Mansbridge showed a melanistic specimen of *Phigalia pedaria*, Fb. Mr. South then referred to the supposed variety of *Pygæa curtula*, L., exhibited at a previous

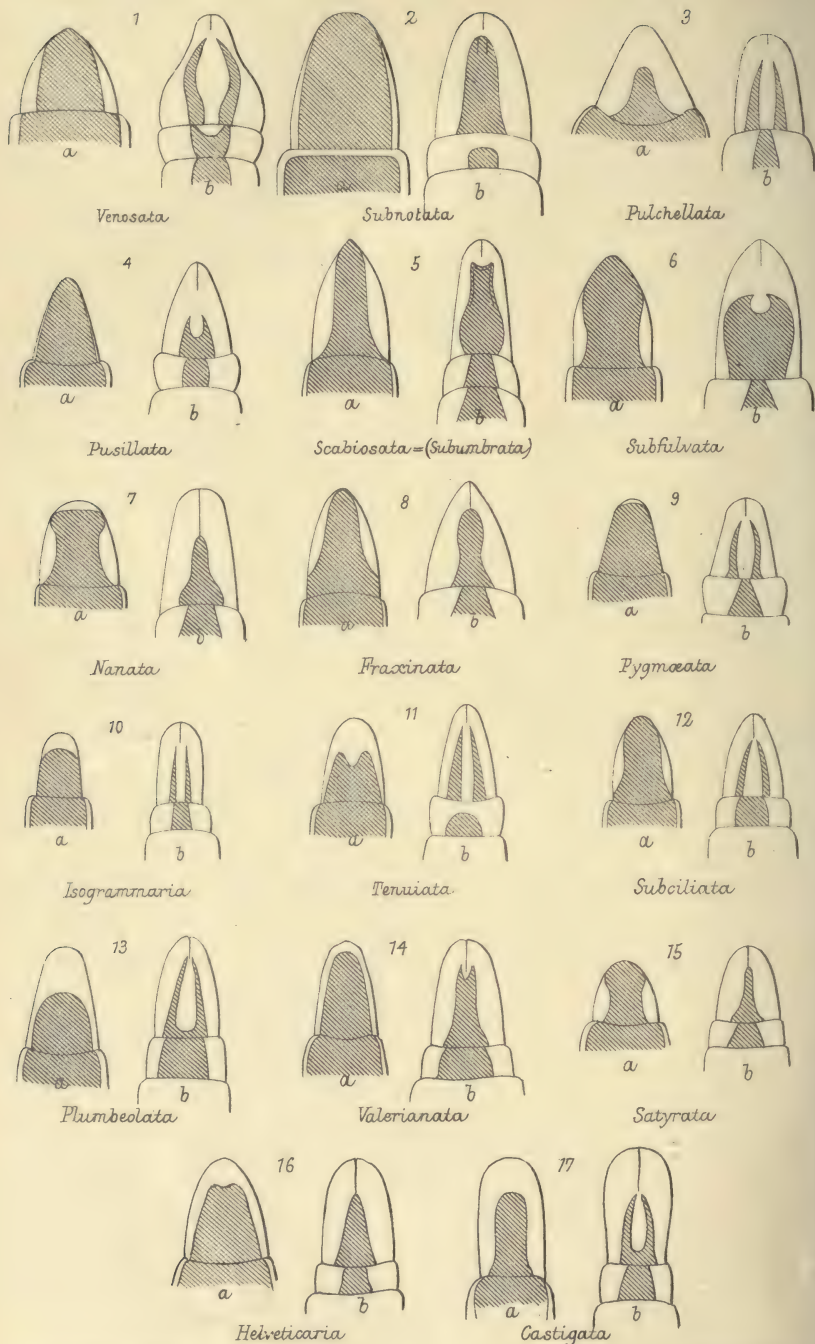
meeting, by Mr. A. Robinson, and remarked that a similar form had been recorded by Mr. Whittich, and an analogous variety of *P. pigra*, Hufn., figured by Stephens. An exhibition of microscopical objects was then given by members.

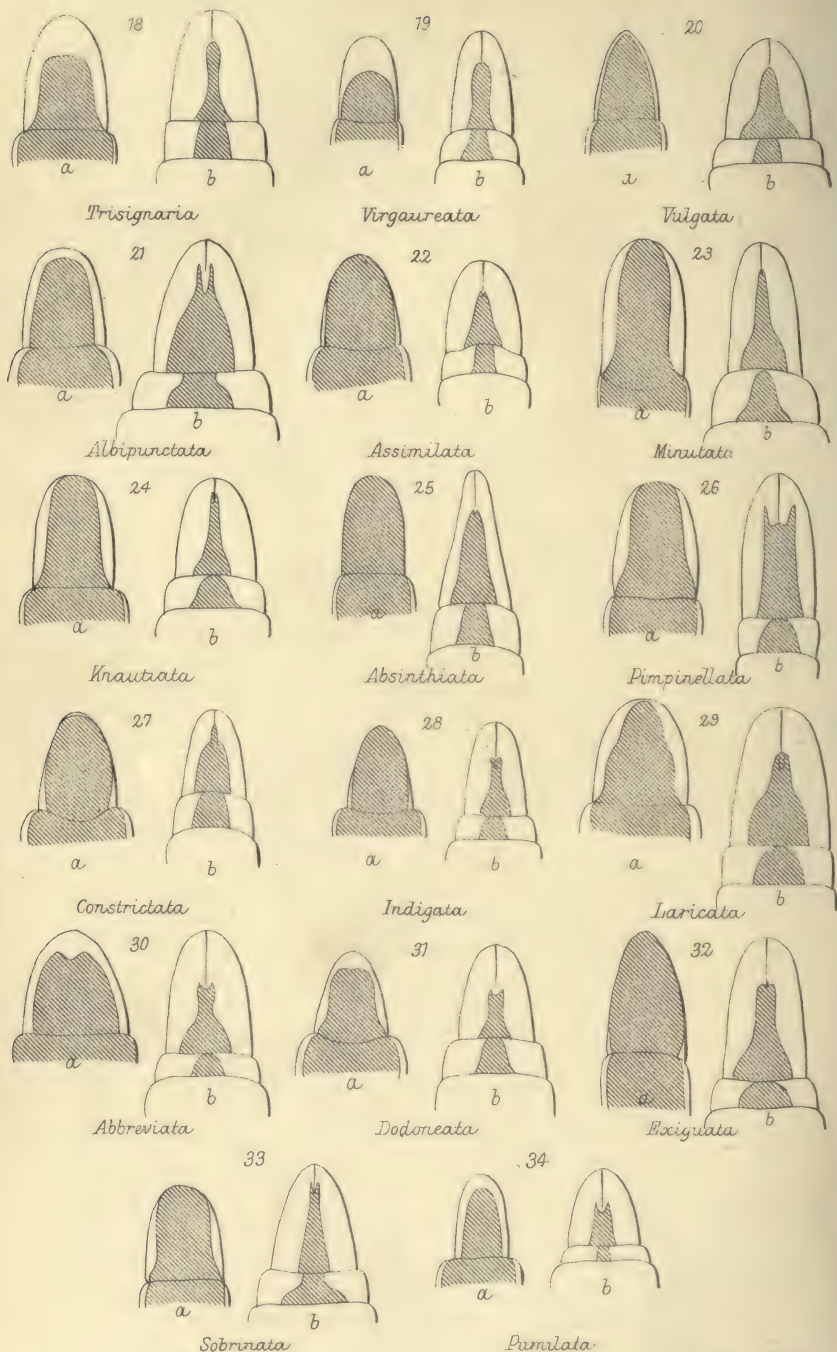
April 9th.—The President in the chair. Mr. A. Hamm, of Reading, was elected a member. Mr. H. Moore exhibited *Caligo nemnon*, from South America, and *Metapodius sericollis*, from Trinidad. Mr. South, three varieties of *Miana strigilis*, Clerck, which were extraordinary forms of the var. *latruncula*, and had been sent to him for inspection by Mr. Jefferys, of Clevedon. Mr. R. Adkin, *Pædisca sordidana*, from Forres, and stated that these were very unlike the specimens from N. Devon. Mr. Cockerell read a note on variation; some discussion followed. Mr. S. Edwards contributed a paper on the Papilionidæ.—H. W. BARKER, *Hon. Sec.*

[Want of space compels us to omit the official report of this Society's Annual Exhibition. It will appear in the June number.—ED.]

LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY.—*April 13th*, 1891. The President, S. J. Capper, F.L.S., F.E.S., in the chair. Messrs. J. Collins, of Warrington, and W. R. Scowcroft, of Prestwich, were elected members. Mr. J. E. Robson, F.E.S., of Hartlepool, read a paper entitled, "Are *Abraxas pantaria* and *A. ulmata* one species or two?" After remarking on the difficulty of obtaining exotic specimens of the genus, the author said that *A. pantaria* had been admitted into the British list on the authority of one specimen taken at Okehampton Park, Somerset. He referred to their geographical distribution, stating that *A. pantaria* only occurred in places where *A. ulmata* was absent; he then minutely described the two forms, comparing the markings of each, and pointed out the difference in the genital armature, which he considered was due to local and climatic causes altering the form of the genitalia. The paper, which was fully illustrated by many cases containing examples of the genus, led to considerable discussion as to what actually constituted a species. Mr. Tutt sent for exhibition the series of *Miana*, from Armagh, that recently caused so much controversy among London entomologists; but so palpably distinct were the specimens of *fasciuncula* and *strigilis*, and so obvious the ease with which the examples could be separated, that no discussion arose. Mr. Robson exhibited some fine varieties of butterflies, and Mr. Collins a wonderful variety of *Leucania lithargyria*, which had the hind wings deeply fimbriated with dark scales, the central portion of the wing being light.—F. N. PIERCE, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—*March 16th*, 1891.—Mr. W. G. Blatch, President, in the chair. Messrs. P. J. and H. Pope were elected members. Mr. Blatch said he had noticed a large number of spring Lepidoptera at Hopwas Wood a few days previously, and had noticed that among the *Hybernia leucophearia*, light specimens seemed to prefer birch trees and dark specimens oaks and other trees with darker barks, their colours thus being assimilated to their surroundings. Mr. Thornehill said that round Burton he noticed what appeared to be two forms of *Phigalia pendaria*: one large and light, found early in open spaces; and one small and dark, and found later in the woods. Mr. Thornehill exhibited a number of *Xanthia* and read notes on them, making several suggestions which provoked considerable discussion.—C. J. WAINWRIGHT, *Hon. Sec.*





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STRUCTURE OF THE TERMINAL ABDOMINAL SEGMENTS IN THE MALES OF THE GENUS *EUPITHECIA*.

BY F. BUCHANAN WHITE, M.D., F.L.S., F.E.S. .

(PLATES I. & II.)

IF the hairs which cover the terminal segments of the abdomen of the males of the genus *Eupithecia* are carefully removed, both the dorsal and ventral aspects of these segments will be found to show certain features which seem to afford specific distinctions. The features in question are due to certain well-defined thickenings of the chitinous material of the segments, and appear as plates which differ in colour and texture from the rest of the segment. I have been able to examine thirty-four species, and in no two species is the structure exactly the same.

ULTIMATE SEGMENT: DORSAL ASPECT.—There is a considerable difference in the size of the plate in different species. In some (e.g., *E. pulchellata*, *E. castigata*, and *E. pumilata*) it neither reaches the apex nor the sides of the segment; in others (e.g., *E. venosata*, *E. satyrata*, and *E. sobrinata*) it attains the apex, but not the sides; whilst in a few species (e.g., *E. absinthiata*, *E. pusillata*, and *E. exigua*) it occupies the whole, or nearly the whole, of the segment, as seen from above. The end of the plate is usually more or less rounded, although it is sometimes slightly pointed, as in *E. pulchellata*, or truncate, as in *E. nanata* and *E. trisignaria*. In a few species the apex is more or less distinctly emarginate or notched. The emargination is very distinct in *E. tenuiata* and *E. abbreviata*, but almost rudimentary in *E. dodoneata* and *E. helveticaria*.

PENULTIMATE SEGMENT: DORSAL ASPECT.—The whole, or nearly the whole, of the dorsal part of the segment is occupied by a plate, whose shape is very similar in all the species.

ULTIMATE SEGMENT: VENTRAL ASPECT.—There is great diversity in the form of the plate. In its simplest form it is triangular (e. g., *E. helveticaria* and *E. assimilata*), or somewhat triangular (e. g., *E. nanata*, *E. fraxinata*, and *E. minutata*). In some other species (e. g., *E. subnotata*, *E. scabiosata*, and *E. subfulvata*) the plate is more oblong in shape than triangular. In a few species the apex of the plate is quite entire (e. g., *E. vulgata*); in others it is minutely (e. g., *E. absinthiata*) or very distinctly (e. g., *E. pimpinellata*, *E. pusillata*, *E. albipunctata*) bifid, till finally the plate becomes divided into two processes united only at the base (e. g., *E. plumbeolata*, *E. castigata*), or apparently entirely distinct (e. g., *E. venosata*, *E. isogrammaria*). (I say apparently distinct, since they may be united under the over-lapping penultimate segment.)

PENULTIMATE SEGMENT: VENTRAL ASPECT.—A narrow plate, whose form varies according to the species, occupies the middle of the segment. In some species (e. g., *E. subnotata* and *E. tenuiata*) it does not reach the hind margin; in others (e. g., *E. minutata* and *E. indigata*) it just touches it. In the majority of cases, however, the hind margin is reached. In *E. venosata* the apex of this plate is emarginate.

THE VARIATION OF THE MARKINGS OF *PAPILIO MACHAON*.

By E. AUGUSTUS BOWLES, M.A.

MR. JENNER WEIR's fascinating theory concerning the probable possession of a costal ocellus by the common ancestor of the House of *Papilio* (Entom. 105) immediately set me to work to examine my series of *Papilio machaon*, and perhaps the following notes may possess some interest in connection with his able article:—

I think he rather underrates the extent of the red suffusion on the upper side of the lower wing of *P. machaon* when he says the second submarginal lunule of the lower wing is "occasionally found" to have a trace of the reddish colour. In eighteen specimens I examined, I find four males and one female with red in the first and second submarginal lunules of the lower wing; one female with red in the first, second, and third lunules; one female with red in the first, second, third, and fourth; and in one female in the first and sixth lunules, the sixth being the lunule immediately before the ocellus at the anal angle. Five males with red in the first lunule only; two males with the red entirely absent in all the lunules, and three with so small a number of red scales in the first lunule that they are scarcely

noticeable without a magnifying-glass. Thus it is possible to have the red suffusion in the first four and the sixth lunules.

I regret to say I have not Mr. Jenner Weir's vast acquaintance with foreign allied species, but having noticed what, I think, a marked connection with the above conclusion, in a species which I find unnoticed by him (unless I have it wrongly named), I add it as my one ewe lamb of further evidence in support of the theory of vanished ocelli. I possess a butterfly named as *Papilio phorcas*, and said to be African, which has an irregular ocellus on the costal angle of the lower wing, the iris of which is blue, much suffused with red; then follow three lunules of red corresponding in position with the second, third, and fourth sub-marginal lunules of *P. machaon*, and there is another red lunule next to the very distinct ocellus at the anal angle. Thus, in both species, red is found in all the lunules excepting the fifth. May it not be possible that their common ancestor possessed six perfect ocelli?

I believe it is a generally accepted theory with evolutionist botanists that yellow was evolved in flowers before red. Perhaps this rule might be applicable also to the animal kingdom, and then may not *P. machaon* be on the road to acquire the further adornment of five additional ocelli?

In the above mentioned five males, in which red is so scanty, there is an additional peculiarity of marking on the upper wings. The yellow markings of the upper wing of a typical *P. machaon* seem to be arranged in four groups:—1. An interrupted line on the hind margin. 2. Eight small spots following the direction of the hind margin. 3. A broad mass extending from the costa near the tip of the wing to the inner margin, and divided into nine spots by black scales surrounding certain of the rays, the two of these spots nearest the costa being again divided by a roundish black spot in each, and the portion of the upper one nearest the hind margin and the tip of the wing is much suffused with black scales. 4. Two spots between the costa and the median ray, one of which is divided into three. The peculiarity in these five males consists of an additional round black spot, which is in the third yellow spot from the costa of group 3. These extra spots are only found on specimens that have very little or no red in the lunules of the under wings.

Myddelton House, Waltham Cross, May 14th, 1891.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. PERRY COSTE, F.C.S., F.L.S.

(Continued from p. 119.)

V.—THE CHEMICAL ASPECT (*continued*).

I.

Before saying anything as to the nature of blue in the various species examined, I will first subjoin, as in the case of green, a list of a few exotic Lepidoptera on which I have been able to experiment since my tables of results were published last August.

NAME.	ACID EFFECT.	ALKALINE EFFECT.
<i>Morpho menelaus</i>	Less brilliant	Less brilliant or O
<i>Trepsichrois linnæi</i> } ..	The velvet "glow" dulled	The glow dulled
("iris" purple) }		
<i>Hypolimnas bolina</i> } ..	(O)	(O) or much dulled, &c.
("iris" purple) }		
<i>H. salmacis</i> (VIOLET)	Duller	Duller or O
<i>Papilio polyctor</i> (crescent marks)	Sort of "yellow"	Same as acid
	(All, except the HCl and HNO ₃ , specimens recovered within five days.)	
<i>P. polyctor</i>	Leaf-brown	Leaf-brown
<i>P. philenor</i>	Bronze	Bronze
	(Recovering, in a few days, either the original bright blue or a bright green.)	
<i>P. nireus</i>	Steel-blue or steel-violet	Same as acid
<i>P. sarpedon</i>	Transparent* or O	Paler or transparent
<i>P. phorbanta</i>	Steel-blue or violet	Same as acid
<i>P. leonidas</i>	Partly transparent	Partly transparent

We will next, following our usual plan, arrange these blue species into groups; but, as will appear from the sequel, it is questionable whether all, except perhaps the *Lycænæ*, might not be put into one single group.

1.	2.	3.	4.	5.
<i>Apatura iris</i> <i>Trepsichrois linnæi</i> <i>Hypolimnas bolina</i>	<i>Papilio philenor</i> <i>P. polyctor</i> <i>P. nireus</i> <i>P. phorbanta</i> <i>P. sarpedon</i> <i>P. leonidas</i>	<i>Papilio machaon</i> <i>Limenitis sibylla</i> <i>Smerinthus ocellatus</i> <i>Catocala fraxini</i>	<i>Vanessa urticae</i> <i>V. atalanta</i> <i>V. io</i> <i>V. antiopa</i> <i>Papilio polyctor</i> (the crescent marks)	<i>Lycæna alexis</i> <i>L. corydon</i> <i>L. adonis</i> <i>L. semiargus</i> <i>Cupido bochus</i>
6.	(ADDENDUM)			
<i>H. salmacis</i>	<i>Morpho menelaus</i>			

* Nitric acid had the extraordinary effect of changing this into a pink.

Now, the first remark that I have to make about blue is that this is a thoroughly disappointing and unsatisfactory colour. There is almost as little satisfaction (in the way of discovering any pigment) to be got out of blue as out of black and white; whilst, in addition, there is considerable worry and perplexity attending the study of these blue wings. I may say at once that in this, alone of all the five colours, I have no clear evidence as yet of there being any pigment present; nay, further, in all the groups, except the *Lycænidæ*,—concerning which I am still in doubt,—it seems fairly certain that the colour is simply “physical.” It is, of course, well known how comparatively rare a colour among flowers is blue; it seems there to mark some special complexity and specially high differentiation in the parts so coloured. It is, therefore, possible that there is, chemically, some considerable difficulty in the evolution of a blue pigment; and, may be, such has not been evolved among the *Insecta*; but, be that as it may, we must certainly admit that the want of pigmental blue in the *Lepidoptera* has been far more than compensated by the unsurpassable brilliancy of the physical blues in which they rejoice. Unfortunately, these physical blues, though very beautiful from an æsthetic standpoint, possess only the minimum of interest from the chemical.

After what I have said in the preceding section on “physical” greens and bronzes, &c., my readers will be able to follow the present discussion without further explanation on these points.

First, of all, as to group 1. In all three of these species there is the same rich purple velvet glow, unmistakably characterising this as a physical colour. Wallace had remarked, some years ago, that the blue of *A. iris* was probably a physical colour, and my experiments fully confirm this. Directly that *A. iris* came into my hands in the course of this research, I felt convinced that there was no pigment colour here; and so it proved. In these three species, the various reagents either are without effect or produce temporary dulling, or permanently injure the surface structure, and consequently the colour.

No. 2 group is still more unsatisfactory. The colours of the species noted here are clearly closely related to those greens which become bronzed or browned; it will be noticed that some of these become of a dull “leaf-brown,” which seems to point to some temporary injury or alteration of a fine surface structure; others become of a steel-blue, which is strikingly “physical” in appearance. Concerning this group, also, there can be no doubt as to the physical nature of the colours throughout. I have included in this group, also, *M. menelaus*, the brilliant blue of which, as I only too truly anticipated, is simply physical. Indeed, it may well be doubted (is there even room for doubt?) whether

any pigment could possibly yield the extraordinary *sheen* that characterises this and some other blues.*

Group 3 is even less satisfactory and less interesting than the last. I have already referred to the blue of *P. machaon*. Anyone who wishes to observe a good example of the behaviour of a physical colour should try the experiment of thoroughly wetting this blue spot on *machaon*, and watching the blue reappearing as the wing dries. The blue of *S. ocellatus* is most unsatisfactory, and, I believe, of the same nature as that of *machaon*. As to *C. fraxini*, I have, in a former place, expressed my intense disappointment at being able to find no kind of clue or connection between this blue and the scarlet of *nupta*, and so many other *Catocalæ*.† It is however, I think, hardly possible to doubt that in *Catocala fraxini* we have simply a physical blue in evidence, and that by no means a brilliant one either.

Before proceeding to group 4, I must make a passing reference to *Hypolimnas salmacis*. My only reason for placing this in a group by itself was not any peculiarity in its behaviour, but simply the fact that its natural colour was a violet, something different, therefore, from any of the other species included in my lists. It is, of course, merely another physical colour.

Now for group 4—the *Vanessidæ*. Sadly, indeed, was I disappointed in these species. In the early days of my experiments I expected great things from experimenting on these beautiful blues. Knowing that in flowers blue usually appeared on highly differentiated parts, it appeared to me of special interest that in the *Vanessæ* the blue should, in most cases, appear as a row of spots *near the edge of the wing*; and, also, on *V. io* in the conspicuous and clearly highly developed ocellus. To the examination of the *Vanessa* blues, therefore, I devoted myself with special interest and attention in the early stages of my work, and made very numerous, repeated, and careful experiments on them. I had not then learned how heavy were the probabilities against any blue being a pigment colour; and it seemed scarcely credible to me that so highly differentiated a pigment, as I assumed the blue to be, should offer any resistance to strong reagents. However, after long and careful experimenting,—in the course of which, as will be noted, I examined four species of *Vanessa*, and in two species separately examined the blue on different parts of the wing,—the hard logic of facts drove me to conclude that in *Vanessa* the blue is pretty certainly *physical*. The phenomena throughout are in accord with this, especially so the frequently observed fact that the blue might vanish during treatment, but reappear on drying the wing. It will be noted that in

* There is another brilliant blue species, whose name I do not know, often to be seen in dealers' cases. In one light this is a brilliant blue, like *menelaus*; in another, a dull colourless brownish. Of course it is positively certain that such a colour must be physical.

† *Ante*, p. 15.

antiopa the blue was least resistant to the reagents; there is of course, as already explained, nothing contradictory in a physical colour thus disappearing. I have included in this group the crescent-shaped blue marks on *P. polyctor*, since the behaviour of these strongly recalled that of the Vanessidæ, especially *V. io*. It is especially to be noted that this blue also returned in a few days.*

And now, in conclusion, we come to the group of *Lycænæ*. I do not know what to say about these species. They are the only blues I know of which are not certainly physical. At one time I thought it highly probable that these were, anyhow, pigment colours; but further reflection and experience have considerably modified my views. On the one hand, there were obtained in each species colour changes, chiefly to a slate colour or grey, that I at one time thought pretty good evidence for a pigment; but, in the light of later work, this conclusion seems to me much shaken. Here, again, we are arguing so much in the dark, being left without any clear answer, such as would be given by either a "solution" or a "reversible" effect. As against the supposition that there is any pigment here, we must set the facts that in *corydon*, at any rate, the blue is suspiciously metallic in appearance; while the same remark applies to many specimens of the *female* of *alexis*—such species, I mean, as are in the intermediate stage of colouring, between the brown of the normal female and the full blue of the male. In addition, I would draw attention to the facts that, as recorded in my original tables,† the blue in several instances acquired a *greenish* tint. This appears to me, now, very suspicious, and somewhat indicative of a physical blue; but since no undoubted pigment blue has yet been found, it is, of course, impossible to assert that such would not become green under the influence of reagents. On the whole, then, pending the appearance of fresh evidence, it seems to me that all we are justified in asserting of *Lycæna*-blue is that it is, anyhow, somewhat different in character from any of the other blues. This much seems clearly shown by its reactions; but whether it be a physical or chemical colour we cannot at present decide.

J.

Having thus examined in turn the evidence yielded by the reactions of each of the various colours, it only remains briefly to sum up the results, before passing on to the few remarks that have to be made on the biological aspect of these experiments. At the same time I may also take the opportunity to make one or two corrections and additions to previous statements.

* It was very difficult to know how to describe the reaction of this species. I have entered the change as that to a "sort of yellow," on account of the appearance of the traces whence the blue had temporarily disappeared. But it must not for a moment be supposed that there was here any question of an actual chemical change to yellow.

† Entom. xxiii. 252.

The most important of these concerns the remarkable behaviour of certain yellow species when submitted to the action of wet potassium cyanide. An account of experiments on this subject—originally written in November, for a footnote to subsection F, but subsequently held back from considerations of space—will be found as an appendix to this section. Again, on looking back, I find that I had adduced* the reactions of *T. rubi* and of the blue Lycænidæ in support of my contention that all the changes effected by my reagents were retrogressive. After the conclusions set forth in the preceding subsections (H and I), however, it is clear that neither of these reactions can properly be quoted as evidence for retrogressive change in pigment colours. For the defence of the position taken up on this subject of retrogressive changes, I can very safely rely on the argument from red species, as stated in subsection E.

Furthermore, I see that in a footnote† to subsection F, as well as in the text, I had referred to the behaviour of *pink* species, and adverted to the possibility that these were changed not to yellow but to white. This remark now seems to me very ill advised and misleading, especially in view of the explanation that I have been at some trouble to set forth in (F) previous pages concerning the relations of red and yellow. In subsequent examination of other pink species, I have found the yellow so pale and feeble (most unlike the bold orange-yellow of, e. g., *Zygæna* and *Arctia*) that it might be easily overlooked, and carelessly mistaken for white. It seems, too, only reasonable that a pale delicate pink should yield a far paler yellow than does a prominent crimson or scarlet.‡ Since, moreover, these pinks agree entirely with the other reds in showing the “reversible” effect, it is certain that their constitution is the same. My hypothetical supposition of a subclass for pinks is, therefore,—as I now think on mature consideration,—entirely erroneous. Indeed, I feel such thorough confidence in the argument from the behaviour of red in general, that if I found a pink species which to a positive certainty changed to white, but showed also the “reversible” effect, I should feel bound to hold that there was yet a yellow pigment there, though so slight and pale as to be imperceptible.§ And, furthermore, if in any case an indubitable white were produced, and no reversible effect were obtainable, we should then have simply an exactly analogous case to that of *Delias*, in which the red first changes to yellow, and then this is dissolved, leaving a white wing. I have, perhaps, spoken at

* Entom. xxiii. p. 371.

† Ante, p. 15.

‡ The amount of pigment present in some of these pink species seems to me to be exceedingly small, as might be anticipated from the pale and delicate colour. There is also special difficulty in observing the exact tint produced, since in many cases the background (e. g., in Sphinges) is very troublesome.

§ It must be remembered that “yellow” is used in a broad sense. The essential difference is between the pigment yellow (*however pale*) and the non-pigment white.

undue length on this point, but it seemed to me necessary to clear up any misunderstanding that may have arisen from what I now see to have been a very misleading statement.

As to the yellow colour of *G. cleopatra*, concerning which I had originally surmised that it would prove very immovable,* I believe that I have already corrected this error by stating that on experimenting with this species I found the yellow to dissolve out, leaving a white wing.

As additional points of interest that have recently turned up, I may note that among some American Bombyces, sent me by Mr. F. M. Jones, were several species of a kind of chestnut colour, which were changed to yellow by acids; thus, again, exemplifying the close relationship of chestnut and yellow. With these should be compared the reaction of *Melitæa athalia*.† Moreover, in two species, *Samia cecropia* (chestnut) and *Callosomia promethea* (a sort of red-brown), after this transformation to yellow, a *slight reversion effect to the original colours* could be obtained, just as in the reds. This appears to me specially interesting, and to point to the fact that these species are—in a coloric sense—connecting links. Furthermore, one of these same American Bombyces, viz., *C. promethea*, was marked with such an unusual looking black that I was induced to experiment upon it. My suspicions were partially justified, for *one* reagent—nitric acid—converted this black into a definite brown. This is certainly a notable exception to the usual behaviour of black; but whether in this species there be really any pigment present, or whether—as I strongly incline to hold—the reaction here was simply that of a *physical* colour, it is as yet impossible to say. Anyhow, the fact is worth recording. In this connection, too, I may add that various black-marked species, such as *Arge galatea*, *A. paphia*, &c., have recently been soaked in 30 per cent. hydrochloric acid *for many days* without the black being affected.‡

Before proceeding to the genealogy of the colours it seems to me only right to point out one or two real or apparent difficulties connected with my rigid separation of physical from pigmental colours. These difficulties arise from the several instances in which the red (pigmental) of one species is replaced by blue (physical) in a closely-allied species.

First of all there is the case of *Catocala fraxini* (the “Clifton nonpareil” or “blue underwing”). In the larger genus of *Catocala* there are a great number of species with red or crimson bands on the under wing; these reds are of course pigmental. There are also species with orange or yellow bands; and these, too, are clearly pigmental. But in the case of *C. fraxini* we have

* *Ante*, p. 38.

† *Entom.* xxiii. p. 250.

‡ I have recently found certain evidence of the presence of pigment in several dull-coloured species, such as *H. semele*, *E. hyperanthes* or *S. egerides* (or both), where, from the superficial appearance, one might have supposed there was nothing but a physical blackish.

neither red nor yellow, but blue — a physical colour. This appears, at first sight, a rather grave difficulty, but it is lessened considerably by the fact that the one blue band of *fraxini* is *not* in the same position as the bands of, e. g., *C. nupta*, but is in a position intermediate between these. More difficult to understand, however, is the case of a species of *Vanessa*,* which I recently saw in Mr. Leech's collection. In this species the (pigmental) red of *V. atalanta* was represented by a blue, that, judging from its appearance, I should say was certainly physical. Finally, it has lately been stated, by Dr. Seitz,† that in a restricted woodland area in S. Brazil the great majority of the insects (*not Lepidoptera only*) were blue; whilst, only a few miles off, red was dominant. This appears to me—taking the statement to be correct—strongly indicative of a blue pigment, produced by some chemical difference in the district. If this be so, it is certainly strange that among so many different families examined I should have found no blue pigment; and I can only say that I should greatly like to experiment on some of those species referred to by Dr. Seitz.

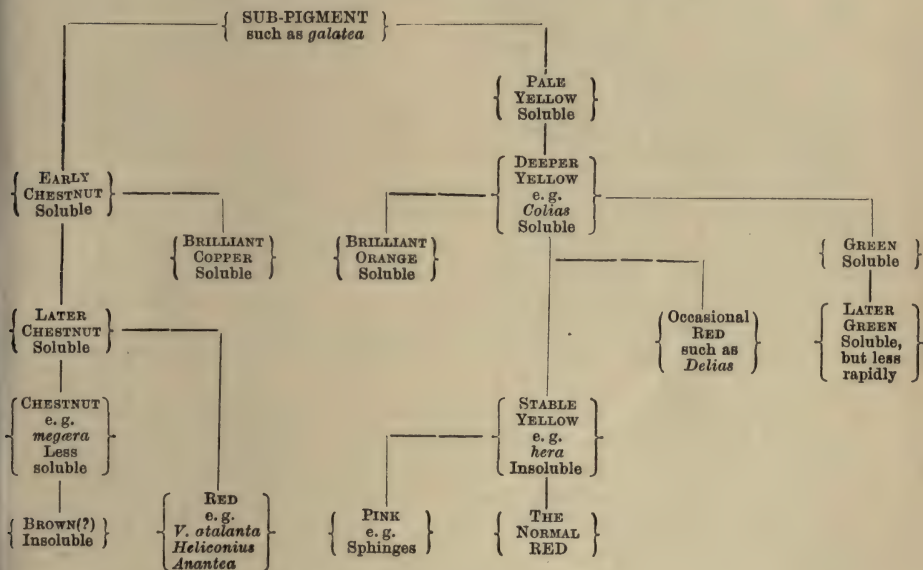
Now for the relations of the colours. Black and white of course are out of court altogether; so is blue, since even if the Lycænidae should turn out to be pigmental, it is impossible, in the present state of our knowledge, to bring this blue, reverting to slate colour or grey, into any genetic relation with the other colours. There remain, then, red (including pink); yellow, in all its modifications; chestnut, also in various modifications; and the (pigmental) greens. Now the facts known to us are these:—Orange and red and pink are developed from yellow; a few reds are developed from chestnut; chestnut and yellow are very closely allied indeed in constitution, indeed it is difficult to draw any definite line of demarcation between some chestnuts and some yellows; green is, not improbably, also developed from yellow, although of this it is not possible to speak certainly at present. Finally, we may have such a thing as a *latent* yellow pigment, as demonstrated by the phenomenon of *A. galatea*. These facts I have sought to bring together, in an easily grasped graphic form, by means of the accompanying genealogical tree. It does not appear to me to involve much unproven theory, except as regards the assumption that the different stems start from one *original* pigment molecule, which, for the sake of a concrete illustration, I have called "*galatea*" stage. This illustration, it will be understood, is adopted only for the sake of plainly grouping all the facts together. It involves, however, very little trespass beyond our known facts. In partial defence of it, I might perhaps point out that *galatea*, which we know *does possess* a "pigment mother substance" convertible to yellow, is very closely allied, entomologically, to the various genera of Satyridæ,

* *Vanessa charonia*, Dru. (Ed.)

† 'Zoolog. Jahrb.,' v. (1890); quoted in 'Microscopic Soc. Jl.,' 1890, p. 712.

most of which are coloured by a chestnut pigment. I do not wish to insist on this fact, but still it is significant in relation to the present argument. There will also be found in the following and concluding section (on the biological aspect) a discussion of certain reported facts in variation which *may* throw very considerable light on, and, indeed, if correct, must be considered a remarkable confirmation of, these arguments.

GENEALOGY OF PIGMENT COLOURS.



(To be continued).

A PRELIMINARY LIST OF THE INSECT-FAUNA OF MIDDLESEX.

COMPILED BY T. D. A. COCKERELL.

(Continued from p. 121.)

Subf. *Apameinæ*.

Gortyna ochracea, Hb., West Hampstead; Kilburn; Willesden; Hammersmith; on the site of present Earl's Court Station; on the site of Shirland Road; back of Warrington Crescent, Maida Vale (*Godwin*); Mill Hill, bred from pupæ found in burdock-stem (*South*); Bedford Park, 1886 (*Chll.*).

Hydræcia nictitans, Bork., Bishop's Wood, Hampstead; Hammersmith (*Godwin*); Mill Hill, at sugar (*South*); Hampstead

Heath (*Watts*); Chiswick (*Sich*); Harefield (*Wall*). *H. micacea*, Esp., Hampstead; Clutterhouse Lane; Neasdon (*Godwin*); Mill Hill (*South*); Bedford Park (*L. M. Cockerell*); Finchley (*Shepherd*); Hammersmith (*Mera*); Hampstead Heath, common (*Watts*); Chiswick, once at marjoram bloom (*Sich*).

Axylia putris, L., Hampstead; Clutterhouse Lane; Old Oak Common (*Godwin*); Tufnell Park (*Shepherd*); Hammersmith (*Mera*); South Hampstead (*Watts*); Chiswick (*Sich*).

Xylophasia rurea, Fb., Hampstead; Clutterhouse Lane; Old Oak Common (*Godwin*); Mill Hill (*South*); Bishop's Wood (*Shepherd*); Harefield, common (*Wall*). *X. lithoxylea*, Fb., Hampstead; Clutterhouse Lane; Old Oak Common (*Godwin*); Mill Hill, at sugar (*South*); Bishop's Wood (*Shepherd*); South Hampstead, common (*Watts*); Harefield (*Wall*); Hammersmith (*Tarbat*); Clapton (*Bacot*). *X. sublustris*, Esp., Harefield, common in 1888 (*Wall*). *X. monoglypha*, Hufn., Hampstead; Clutterhouse Lane; Old Oak Common (*Godwin*); Mill Hill (*South*); Isleworth (*Fenn*); Bedford Park (*Ckll.*); Bishop's Wood (*Shepherd*); Hammersmith (*Mera*); Harefield (*Wall*); Clapton (*Bacot*); Dalston (*Prout*). *X. hepatica*, L., Hampstead; Clutterhouse Lane; Old Oak Common (*Godwin*); Mill Hill (*South*); Chiswick, once (*Sich*). *X. scolopacina*, Esp., Bishop's Wood, Hampstead, especially larvæ, common, 1873 (*Godwin*); Highgate (*Mera*).

Diptyrygia scabriuscula, L., Bishop's Wood; Clutterhouse Lane; Kingsbury (*Godwin*); Mill Hill, at sugar (*South*); Highgate (*Mera*); Regent's Park, 1882 (*Watts*); Chiswick (*Sich*); Harefield, 1887 (*Wall*); Hammersmith (*Tarbat*).

Neuronia popularis, Fb., Hampstead Heath; banks of Thames between Putney and Hammersmith (*Godwin*); Mill Hill, at light, comes about 9.30 p.m. (*South*); Harefield (*Wall*).

Charæas graminis, L., Hampstead Heath; one specimen on Old Oak Common (*Godwin*).

Cerigo matura, Hufn., Bishop's Wood, not common (*Godwin*);* Mill Hill (*South*); Harefield (*Wall*).

Luperina testacea, Hb., Hampstead Heath (*Godwin*); Mill Hill, at sugar, and at light (*South*); Bedford Park (*Ckll.*); Highgate (*Shepherd*). *L. cespitis*, Fb., Hampstead Heath, rare (*Godwin*); Mill Hill, at station lamp, 1875 (*South*).

Mamestra sordida, Bork., Mill Hill (*South*); South Hampstead (*Watts*). *M. brassicæ*, L.,† generally distributed (*Godwin*); Mill Hill, at sugar (*South*); Isleworth (*Fenn*); Bedford Park (*Miss E. Sharpe*); Tufnell Park (*Shepherd*); Hammersmith (*Mera*); South Hampstead (*Watts*); Harefield (*Wall*); Clapton (*Bacot*);

* Cited in the MS. list as *texta*.

† On account of its armed tibia, hairy eyes, and the peculiar male genitalia, this species has been placed by Smith and Grote in a distinct genus, *Barathra*, Hb. (= *Copimamestra* Grote).

Dalston (*Prout*). *M. persicariæ*, L., Mill Hill, at sugar (*South*); Bedford Park (*Miss E. Sharpe*); Tufnell Park (*Shepherd*); Hammersmith (*Mera*); larvæ very abundant in garden, South Hampstead (*Watts*); Clapton (*Bacot*); Dalston (*Prout*); Bloomsbury (*Brit. Mus.*). *M. abjecta*, Hb.,* Willesden (*S. T. Klein, J. of Micr. and Nat. Sci., 1887*).

Apamea basilinea, Fb., Hampstead (*Godwin*); Mill Hill (*South*); Isleworth (*Fenn*); Bedford Park (*Ckll.*); Bishop's Wood (*Shepherd*); Hammersmith (*Mera*); Tottenham (*Prout*). *A. unanimitis*, Tr., Mill Hill, at sugar, and also larvæ (*South*); Tufnell Park (*Shepherd*). *A. ophiogramma*, Esp., Hammersmith (*Mera*); common at South Hampstead (*Watts*); Chiswick, once (*Sich*). *A. didyma*, Esp., Hampstead; Old Oak Common; Hendon; Clutterhouse Lane (*Godwin*); Mill Hill (*South*); Bedford Park (*Miss E. Sharpe*); Tufnell Park (*Shepherd*); Hammersmith (*Mera*); Chiswick, extremely abundant (*Sich*); Harefield (*Wall*); Clapton (*Bacot*); Dalston (*Prout*). *A. leucostigma*, Hb., near Uxbridge† (*Benbow, Entom., 1878, p. 21*).

Miana strigilis, Clerck, common (*Godwin*); Mill Hill (*South*); Finchley (*Shepherd*); Hammersmith (*Mera*); Hampstead (*Watts*); Chiswick (*Sich*); Harefield (*Wall*); Clapton (*Bacot*); Dalston (*Prout*). *M. strigilis* var. *æthiops*, Haw., Highgate (*Shepherd*); very abundant in garden, South Hampstead (*Watts*); see also *Entom.*, 1888, pp. 60, 93, 111, 112, 247, 249. *M. fasciuncula*, Haw.,‡ Kensal Green (*Godwin*); Mill Hill (*South*); Finchley (*Shepherd*); Hammersmith (*Mera*); Hendon, abundant, 1881 (*Watts*); Chiswick, one (*Sich*); Harefield (*Wall*). *M. bicoloria*, Vill., Clutterhouse Lane (*Godwin*); Mill Hill (*South*); Finchley (*Shepherd*); Hampstead (*Watts*); Harefield (*Wall*); Clapton (*Bacot*); Dalston (*Prout*); Chiswick (*Sich*). *M. arcuosa*, Haw., Hampstead Heath; West Hampstead; Old Oak Common, in abundance (*Godwin*); Mill Hill, flying at dusk over grass in damp fields (*South*); Finchley (*Shepherd*); Pinner (*Watts*); Harefield (*Wall*).

Subf. *Hadeninæ*.§

Dianthœcia capsicola, Hb., Old Oak Common, larvæ, common (*Godwin*); Mill Hill, at sugar (*South*); Bedford Park, larvæ on *Lychnis vespertina*, 1886 (*Ckll.*); South Hampstead (*Watts*); Harefield (*Wall*). *D. cucubali*, Fues., Clutterhouse Lane, larvæ, common (*Godwin*); Mill Hill (*South*). *D. carpophaga*, Bork., Mill Hill, at sugar, and also bred (*South*); Harefield, two taken (*Wall*).

* *M. abjecta* is placed by Mr. Tutt in *Hadena*.

† As *fibrosa*. This species is placed by some in a separate genus, *Helotropia*, Ld.

‡ This has been considered a variety of *strigilis* by Mr. Tutt; but Mr. Pearce (*Brit. Nat.*, April) seems to have proved the distinctness of the two species beyond doubt.

§ This subfamily seems to come more naturally here than where it occurs in our lists. *Hadena*, Guen., is considered by Mr. Butler a group of *Mamestra*.

Hecatera serena, Fb., Old Oak Common (Godwin); Mill Hill (South); Bishop's Wood (Shepherd); near Acton (Mera); Hampstead (Watts); Chiswick, common (Sich).

Polia flavicincta, Fb., Mill Hill, at sugar (South); Harefield, occasional (Wall); Bedford Park, one specimen, 1890 (Ckll.). Newman says of this species, "common near London"; but in Middlesex it appears to be rather rare.

Epunda nigra, Haw., Willesden (Klein).

Cleoceris viminalis, Fb., Harefield, two taken (Wall).

Miselia oxyacanthæ, L., generally distributed (Godwin); Mill Hill (South); Bishop's Wood (Shepherd); Harefield (Wall). *M. oxyacanthæ*, form *capucina*, Mill., Harefield, occasional (Wall); Mill Hill, not uncommon (South).

Agriopis aprilina, L., Bishop's Wood, rare (Godwin); Mill Hill, at sugar, also bred (South); Pinner and Stanmore, pupæ (Watts); Harefield (Wall).

Euplexia lucipara, L., Bishop's Wood, common (Godwin); Mill Hill (South); Tufnell Park (Shepherd); larvæ very abundant in garden (Watts); Clapton (Bacot); Dalston (Prout); Chiswick, larvæ on mullein and *Lastræa* (Sich).

Phlogophora meticulosa, L., generally distributed (Godwin); Mill Hill (South); Bedford Park (Miss E. Sharpe); Tufnell Park (Shepherd); Chiswick (Mera); Hampstead (Watts); Harefield (Wall); Isleworth, larva on lemon-geranium (Ckll.); Bedford Park, 1890, larva on *Polygonum cuspidatum* (Ckll.); Clapton (Bacot); Dalston (Prout).

Aplecta nebulosa, Hufn., Bishop's Wood (Godwin); Hampstead, 1880, &c. (Watts); a dark var. in Highgate Woods (Hodges, fide Buckell, Ent. Rec., 1890, p. 160).

Hadena protea, Bork., Bishop's Wood; Kingsbury; Old Oak Common (Godwin); Mill Hill (South); Harrow (Watts); Harefield (Wall). *H. dentina*, Esp., Kingsbury (Godwin); Mill Hill (South); near Ealing (Mera); South Hampstead (Watts). *H. trifolii*, Rott., common generally (Godwin); Mill Hill (South); Bedford Park (L. M. Cockerell); Bishop's Wood (Shepherd); Hammersmith (Mera); South Hampstead (Watts); Clapton (Bacot); Dalston (Prout); Chiswick, larva on cultivated asparagus (Sich). *H. atriplicis*, L., Hampstead (Newman). *H. oleracea*, L., generally common (Godwin); Mill Hill (South); Isleworth (Fenn); Bedford Park (C. Rowland); Finchley (Shepherd); Hammersmith (Mera); South Hampstead (Watts); Harefield (Wall); Clapton (Bacot); Dalston (Prout); Chiswick, larva on *Convolvulus major*, &c. (Sich). *H. pisi*, L., Bishop's Wood, common; Hampstead Heath (Godwin); Mill Hill (South); Hammersmith (Mera). *H. thalassina*, Rott., Hampstead Heath, on fences (Godwin); Mill Hill (South). *H. genistæ*, Bork., Old Oak Common; Hampstead Heath, rare on fences (Godwin); Mill Hill (South); Harefield, one bred from pupa (Wall).

Subf. *Caradrininae*.

Grammesia trigrammica, Hufn., Hampstead; Clutterhouse Lane; Kingsbury; Old Oak Common (*Godwin*); Mill Hill, at sugar, very abundant (*South*); Finchley (*Shepherd*); Harefield (*Wall*).

Caradrina morpheus, Hufn., Clutterhouse Lane (*Godwin*); Mill Hill, at privet blossom, sugar, and honey-dew (*South*); Tufnell Park (*Shepherd*); South Hampstead (*Watts*); Clapton (*Bacot*); Dalston (*Prout*); Chiswick (*Sich*). *C. alsines*, Brahm., Mill Hill, at privet blossom, sugar, and honey-dew (*South*); Tufnell Park (*Shepherd*); Harefield (*Wall*); Chiswick, once (*Sich*). *C. taraxaci*, Hb., Elgin Road (*Godwin*); Mill Hill, at privet blossom, sugar, and honey-dew (*South*); Kentish Town (*Shepherd*); Harefield (*Wall*). *C. quadripunctata*, Fb., Elgin Road (*Godwin*); Mill Hill, at privet blossom, sugar, and honey-dew (*South*); Tufnell Park (*Shepherd*); South Hampstead (*Watts*); Harefield (*Wall*); South Kensington (*Chitty*); Dalston (*Prout*); Chiswick (*Sich*).

Rusina tenebrosa, Hb., Kingsbury; Bishop's Wood, Hampstead (*Godwin*); Highgate (*Mera*).

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

NOTES ON SPRING LEPIDOPTERA IN THE CHESTER DISTRICT.—The evening of February 27th was fine, warm, starry, and accompanied by slight fog. From the gas-lamps I took *Hybernia rupicapra*, *H. marginaria* (*progemmaria*), and *H. defoliaria*—the latter being common, and, like my other February specimens, apparently fresh from the chrysalis. March 17th.—In the evening I searched an early flowering sallow for moths; result, not a moth to be seen. March 21st.—I went to Delamere Forest in quest of a female *Nyssia hispidaria* for a friend; I only took a couple of males. Saw three male and one female *H. marginaria* (very light-coloured, as all the Delamere specimens are that I have come across), one *Anisopteryx aescularia*. Took half-a-dozen male *H. leucophaea*, which included the light and dark forms figured by Newman, as well as intermediates. March 24th.—A specimen of *A. flavicornis*—the larva I came across in the forest last summer—emerged at 12.30 a.m. April 4th.—I paid another visit to Delamere; went through the usual 5½ hours' solitary search: one male *N. hispidaria*, just out of the chrysalis (they emerge from mid-day up to about 3 p.m.). Left it on a tree to expand its wings in natural conditions: the interrupted process (say, in a pocket box) is almost certain—I might say certain—to end in what is known as “saccular distension.” Marked the tree, of course, for my return, when I found the moth to be a finely-developed insect. My total captures numbered three: the *Nyssia*, a male *H. leucophaea*, and a male *A. aescularia* drying its wings on an oak. I find my

luck with *N. hispidaria* to be on a par with that of other entomologists who have worked the forest for it this season. I have only heard of the capture of a solitary female. The fact, probably, is that the insect, like a few more "good things," is difficult to *time*—an important factor in studying the preservation of species! April 5th.—Warm, spring-like. The *Taniocampa* larva taken from a garden rocket last June, in the Vale of Llangollen, and referred to in my notes (Entom. 16), emerged a fine *T. stabilis*, with all due honours, including the "black dot at the base of the wing" (Newman, p. 361). My notes describe this larva as follows:—"Apple-green, delicately suffused or mottled with white along the back; head apple-green, and smaller than the second segment; each segment is well divided by a yellowish division, as in *Pachnobia leucographa*. When disturbed it curls up first half of body like *P. leucographa*. Thin white dorsal line, not very distinct, down middle of back; a broad clearly-defined white stripe along each side; between this stripe, on each side, and the dorsal white line is another thin white stripe; under surface and sides apple-green; body has a few, but very few, short black hairs; the body tapers towards each extremity, especially towards the head. I fed it on willow." April 6th.—Breeze N.E. again. Bitterly cold. In the Chester cemetery, after dark, I searched the willows with the aid of my pocket-lamp. On one bush only I found moths—a couple of *T. gothica*. The willow bloom, with the exception of a few dwarf bushes, was over, in the Chester district, by the 8th of May. The earliest flowers I came across were upon a solitary tree, March 17th. *Taniocampa stabilis* and *T. gothica* have scarcely been as plentiful as they might have been. The first-named varies with us, in shade, from grey to russet-colour. I have had moths of both species confined in glass jars, with a gauze covering, elastic band, and square of glass on the top,—feeding them daily with fresh catkins in blossom,—in order to obtain eggs, and test the variation in colour and markings of the caterpillars, which, I have reason to think, in the case of *T. stabilis*, is considerable. I have succeeded in each case; the eggs of the last-mentioned have just hatched, and the larvæ are little black-headed fellows, at present with almost colourless bodies. *T. cruda* I found so uncommon that I only came across four specimens. *T. gracilis*—never a common moth with us—was such a rarity this season that I only secured a solitary male. It is a remarkable fact that I never once saw *T. incerta (instabilis)*, and, up to date, I have not even heard of *T. opima* being seen. The Geometers observed about the willows—such as *Selenia bilunaria (illunaria)*, *Anticlea badiata*, *Hybernia marginaria (progemmaria)*—have been as plentiful as ever; fine specimens of *A. badiata* are still nightly on the wing. *Cidaria suffumata* I first noticed on the night of May 9th—commonly enough. *Nyssia zonaria* appeared April 26th, but females only! Of hibernating caterpillars I saw *Arctia caja* on April 25th. Larvæ of *Agrotis ashworthii* have been exceedingly scarce this season. It may interest young entomologists to know that sloe and willow—especially dwarf bushes—should, up to the end of June, be searched for night-feeding larvæ, with, of course, the aid of a lantern. Dock leaves, not forgetting the under sides, chickweed, groundsel, violets, &c., should also be examined. After June, search the leaves of willow, oak and birch well over in the daylight, and do not miss the under surfaces, for eggs and larvæ. You will often come across "good things," and, even amongst common ones, surprises and matters of interest—unheard of in books—will frequently occur. Speaking

of violets—I mean the scented ones—we have the three varieties (all within four miles of Chester), the white, the pink, and the violet forms. Were they moths they would certainly be separated by distinctive names; but our botanists refuse to recognise any other synonym than the common, but amply descriptive, *Viola odorata*. My first butterfly, *Pieris rapæ*, appeared on May 2nd. All the fruit trees here, including the almond, which, by the way, not only blossoms at Chester but bears fruit, are now in full and magnificent bloom.—J. ARKLE; Chester, May 11, 1891.

THE SALLOW IN YORKSHIRE IN 1891.—In this district sallows have been late, owing to the cold weather; however, on Tuesday evening, April 14th, 1891, I and Mr. S. Walker, of this city, visited Bishop's Wood, near Selby, and having selected several likely trees situate on the border of the wood and principal ride, as soon as darkness set in we commenced shaking into two large sheets which we had brought with us, and succeeded in taking a few *Tæniocampa populeti* (for which this wood is noted); they were mostly in fair condition, although a few showed signs of having been out some time. I was fortunate enough to take one specimen of *Pachnobia leucographa*, which was in fine condition, evidently having just emerged. This species is generally somewhat later in its appearance than the rest of the *Tæniocampæ*. *T. cruda* was fairly common, and from amongst those seen we managed to select a few slight varieties. *T. gothica* was not uncommon, and all the specimens seen were in good condition. *T. instabilis*, *T. stabilis*, and *P. munda* occurred sparingly, together with an odd specimen or two of *T. rubricosa*. *Cerastis vaccinii* was the only other species noted, and of this we saw few examples. *T. gracilis* was very conspicuous by its absence, as neither of us saw a single specimen. This species seems to emerge later than others of the genus. None of the species taken during the evening occurred in any numbers; and this was the more surprising seeing that the night was, or appeared to be, a very suitable one as it was dark, warm, and still, with the wind in the north-west. On the borders of the wood, after dark, we noticed *Anticlea badiata* flying commonly, as many as six and eight being seen at one time; it seemed to be most abundant about 10 p.m. The specimens taken were in good condition. We also noticed three or four *Hybernia marginaria* (*progemmaria*), which were of course worn, and a few *Diurnea fagella* at rest and on the wing. We returned to York by the 12.30 midnight train from Selby, after having spent a most enjoyable evening.—W. HEWETT; 12, Howard Street, York.

AN ENTOMOLOGICAL MYTH.—Mr. Dale (Entom. 123) appears to have overlooked Mr. Buckler's description and differentiation of the larvæ of *Cucullia scrophulariæ* and *verbasci* in E. M. M. iv. 116. The larvæ of *scrophulariæ* there described were received from Mr. Doubleday on 8th July, 1867, and though it is not said they were British, I have always presumed they were, as nothing was said to the contrary; but with this exception I have never met with any trace of true *scrophulariæ* in Britain. In all the collections I have seen it is either unrepresented, or *verbasci* does duty for it. The perfect insect much more closely resembles *lychnitis* than *verbasci*, and might readily be passed over for it, the chief differences being in the costal streak in *lychnitis* being narrower than in *scrophulariæ*, as well as blacker in colour, and the pale area in the centre of the wing being consequently more extensive. Though I have had no personal experience with them, I

think it probable that the larvæ of all the three will feed on any of the mulleins or figworts. If we could assume that the larvæ sent by Mr. Doubleday to Mr. Buckler in 1867 were not British, we might further assume that Haworth really had *lychnitis*, and called it *scrophulariæ* in error. This would clear up the mystery; and I certainly think, until some positive evidence can be produced of its occurrence in Britain, the very little purely negative evidence that exists is not enough to entitle it to be retained on our lists.—JOHN E. ROBSON; Hartlepool.

CUCULLIA SCROPHULARIÆ IN ENGLAND.—With regard to Mr. Dale's enquiry (Entom. 123) as to whether this species had been taken in England, I believe there is no doubt but that it has; but it is extremely rare. The late Mr. Frederick Bond was quite certain it was a distinct species, not separable in the imago, but distinct in the larval state. During Mr. Bond's long experience, he was accustomed every year to see abundance of *verbasci*, both on mullein and figwort, and was consequently well acquainted with the larva, but he never found *scrophulariæ* excepting at one spot, a railway cutting at Whittlesford, where the larva formerly occurred abundantly. During the later years of Mr. Bond's life, he many times searched this place and the neighbourhood for larvæ of *scrophulariæ*, but never succeeded in again finding it. He told me there was not the possibility of mistaking the larva, if seen, as it was quite distinct in appearance from *verbasci*. Stainton indicates that *scrophulariæ* is the smaller insect of the two, and a continental type of *scrophulariæ*, which I have is much smaller than my *verbasci*; indeed, I have only one which at all approaches it in smallness, though there is this reservation to be borne in mind, that I have at times bred large numbers of *verbasci*, and would doubtless pick the largest for the cabinet. I have several plants of both *Verbascum nigrum* and also *thapsus*, in the garden, and there is generally a batch of larvæ on the former, and sometimes also on the latter, but *nigrum* is generally preferred. *Scrophularia aquatica* is common in ditches in the neighbourhood, and the larva is usually plentiful upon it.—ALFRED BALDING; Wisbech.

CUCULLIA SCROPHULARIÆ PROBABLY SPECIFICALLY IDENTICAL WITH C. LYCHNITIS.—In his note (Entom. 123) Mr. Dale repeats what I have long stated privately, and I believe also in notes to the 'Entomologist,' that *C. scrophulariæ* is probably not found in Great Britain at all; indeed I share the doubts hinted at by Guenée as to the validity of the species. I have specimens of the imago from Dr. Staudinger, taken in Saxony; from the excellent entomologist, lately a curator at the Hamburg Museum, taken in that district; and also specimens bred from larvæ sent to Mons. A. Wailly from Toulouse at my request. All these agree, and Guenée correctly describes the differences, which are indeed readily apparent. I have also specimens of the larvæ from all these places, and they too are palpably different from *C. verbasci*. The doubt comes in when *scrophulariæ* is compared with *lychnitis*. I have the imago of *lychnitis* from Bohemia, South of France, and different sources in Great Britain; and if any difference be perceptible it is in a more ochreous tone of *lychnitis*, and in the costal dark margin being distinctly more powdered with gray atoms; but local influences, in countries so widely apart, produce such slight variations, that it is presumptuous to dogmatize on trivial distinctions without long and close study. As to the larvæ of *lychnitis*, which I have from the same places, they are absolutely indistinguishable from *scrophulariæ*; and my

opinion is summed up by saying that *verbasci* is a good species, but that the identity of *scrophulariæ* with *lychnitis* is likely to be proved, when any specialist has the opportunities for close and extended comparisons.—N. T. DOBREE; Beverley, E. Yorks.

LATE APPEARANCE OF *HYBERNIA DEFOLIARIA*.—On Jan. 26th last, I bred a specimen of *Hybernia defoliaria*, the pupa of which had been kept in a greenhouse all the winter, where, although not much heat was used, it would certainly be protected from the frost, and would be quite as warmly situated as it ever could be out of doors, however mild the winter. It would appear then that this species may remain in the pupa state up to the end of January, quite irrespective of any retardation by excessively inclement weather. I may also mention that on May 4th, 1891, I took at light, here, a quite fresh specimen of *A. æscularia*.—W. M. CHRISTY; Watergate, Emsworth, Hants.

LATE APPEARANCE OF *EUCHLÖE CARDAMINES*.—In reply to Mr. Perry Coste's note on the late appearance of *E. cardamines* at Mürren, may I suggest that Mürren is 5000 ft. above sea-level, and that it is one of the commonest experiences in Swiss collecting to find insects that are mere rags in the valleys, only just emerged, a few thousand feet up. As to *Gonopteryx rhamni*, I have found it fairly abundant in more than one Swiss valley during the month of August.—R. S. STANDEN; 67, Earl's Court Square, South Kensington, May 10, 1891.

COCCINELLIDÆ EATEN BY BIRDS.—As a contribution to the discussion on this subject (*vide* Entom. 122), I may record that Mr. W. P. Lowe sent me the contents of the stomach of a road-runner, *Geococcyx californianus* (Less.), a female, shot by him at the Big Aroyas, Pueblo Co., Colorado, Dec. 5th, 1889. The food of this bird, as exemplified by the specimen sent, consisted of Acrididæ (grasshoppers), *Coccinella* sp., Curculionidæ (*Ophyastes tuberosus* and perhaps another allied species), and a blue-green rugose metallic fragment of an unknown insect.—T. D. A. COCKERELL; 3, Fairfax Road, Bedford Park, W., May 10, 1891.

DEIOPEIA PULCHELLA IN THE TRANSVAAL.—In the report of the February meeting of the Entomological Society I notice that Canon Fowler exhibited a cocoon of this moth, which had been received from Lower Burmah. *Deiopeia pulchella* is to me a very old acquaintance. I have caught it in Surrey; met with it again in the Malay Peninsula; received it from Mogador; and now, at the other end of Africa, find it not at all uncommon. The time of its appearance in the Transvaal is very protracted. I first captured it at the end of September—the beginning of our summer—and now, at the end of March, it is still moderately common, principally frequenting the open and treeless veldt. Flying in the strong sunlight, I have often mistaken it for a large *Lycænid*, as the pale azure blue of the posterior wings is wonderfully reflected, and the red and black spots of the anterior wings during flight are scarcely, if at all, visible. Its flight is short, and it is easily captured.—W. L. DISTANT; Pretoria, Transvaal, March, 1891.

PÆCilocampa POPULI AND INSECT VITALITY.—An instance of the tenacity of life in insects, and their power of withstanding extremely low temperatures, was exemplified in the case of a December moth (*Pæcilocampa populi*) which was found here by my brother, Mr. Frederick

Anderson, on Jan. 5th, in a parapet at the top of the house, frozen tightly to the lead-work in a little lump of ice. So securely was it attached that it was with great difficulty removed. It was brought to me apparently lifeless, stiff, and as a specimen, useless. I placed it, however, in a chip box, and held it to the fire for a few minutes. Upon opening the lid, I was surprised to see it had quite revived; it proved to be a fine male in capital condition, and in no way injured by the freezing and imprisonment which it had undergone.—JOSEPH ANDERSON, Jun.; Chichester.

SIREX GIGAS IN MARCH. — A specimen of *Sirex gigas* was captured at the south end of the town on March 9th, and given to me a few days after. It had been impaled with a French nail which, when extracted, left an ugly hole between the thorax and abdomen.—J. E. KNIGHTS; North Denes, Great Yarmouth.

NOTES FROM YARMOUTH.—The usual Easter Monday ramble of the Yarmouth Naturalists' Society, in which I took part, produced only one or two *Hybernia progemmaria* that had been blown into Lound Run, a small stream of water. Frequently during the day hail and rain storms were experienced. I saw a *Pieris rapæ* in the window of a restaurant, on the 31st of March, which had most probably been carried there with some vegetables when in its larval state, pupated in a safe corner, and emerged. This species seems to have started for the year on the 12th April. *P. brassicæ* was seen on the wing on 28th April.—J. E. KNIGHTS; North Denes, Great Yarmouth.

BLACK-HEADED GULL FEEDING ON INSECTS.—I can support the observation of Mr. Newstead published in your last number, by a similar one. When on the Shannon and a tributary of it near Banaglen, two years ago, I went out entomologising, and on every evening, at dusk, noticed a large number of these birds hawking about very close to the water level, and at the edge of the fringe of bullrushes and reeds, with much activity. On watching their operations I found, to my surprise, they were feeding on stone-flies and other Neuroptera, which were very numerous in crepuscular flight; and long after dusk, far into the night, when even their white plumage scarcely enabled me to distinguish the birds, they continued on the wing in active pursuit of their prey. It seemed to me an interesting illustration of adaptation to environment, as this species breeds on the islands of inland waters, and in the Bog of Allen, in two places to my knowledge, have established very extensive breeding-places on the bog, where they must miss the abundant supply of fry which is afforded by marine localities during the breeding season. There is evidence also that this gull is active in the pursuit of *Bombyx callunæ* and other moths.—W. F. DE KANE; Sloperton Lodge, Kingstown.

QUERY RESPECTING FIELD APPARATUS.—I should be obliged to readers of the 'Entomologist' for information as to the best means of conveying impedimenta necessary to the entomologist when out collecting; I mean so as to get the apparatus into as little space as possible. I think if some of our practical entomologists were to inform us of the means they adopt, they would confer a favour upon many, in addition to myself. — W. HEWETT; 12, Howard Street, York.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*May 6th, 1891.*—Mr. Frederick DuCane Godman, M.A., F.R.S., President, in the chair. Mr. Robert A. Dallas Beeching, of 24, St. James's Road, Tunbridge Wells, Kent; Mr. H. Shortridge Clarke, of Douglas, Isle of Man; Monsieur Léon Fairmaire, of 21, Rue du Dragon, Paris; Mr. Wm. Reid, of Pitcaple, Aberdeenshire; and Mr. Nelson M. Richardson, B.A., of Montevideo, Weymouth, were elected Fellows of the Society. Dr. D. Sharp exhibited a number of eggs of *Dytiscus marginalis* laid on the sheath of a species of reed, and commented on the manner of their oviposition, which he said had been fully described by Dr. Régimbart. The Rev. A. E. Eaton exhibited a collection of *Psychodidæ* from Somersetshire, including six species of *Psychoda*, eleven species of *Periconia*, and one species of *Ulomyia*. Mr. M'Lachlan commented on the interesting nature of the exhibition. Mr. P. Crowley exhibited a specimen of *Prothoë caledonia*, a very handsome butterfly from Perak; and a specimen of another equally handsome species of the same genus from Tonghou, Burmah, which was said to be undescribed. The Secretary read a letter from Mr. Merrifield, pointing out that the statement made by Mr. Fenn, at the meeting of the Society on the 1st April last, of his views on the effect of temperature in causing variation in Lepidoptera, was incorrect; he (Mr. Merrifield) had never suggested what might happen to *Taniocampa instabilis*, and had expressly stated that he had found a reduction of the temperature below 57° to produce no effect, whereas in Mr. Fenn's experiments the temperature must have been below 40°. The Secretary also read a letter which Lord Walsingham had received from Sir Arthur Blackwood, the Secretary of the Post Office, in answer to the memorial which, on behalf of the Society, had been submitted to the Postmaster-General, asking that small parcels containing scientific specimens might be sent to places abroad at the reduced rates of postage applicable to packets of *bonâ fide* trade patterns and samples. The letter intimated that, so far as the English Post Office was concerned, scientific specimens sent by sample post to places abroad would not be stopped in future.—H. Goss, *Hon. Secretary*.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY. *April 23rd, 1891.*—W. H. Tugwell, President, in the chair. Mr. E. Sabel, of Clapham, was elected a member. Mr. R. South exhibited a series of *Polyommatus phlæas*, L., among which were examples of the vars. *schmidtii*, Gerh., and *eleus*, Fab., and some other interesting aberrations, together with representatives of the species from Europe, Asia and Africa. Mr. R. Adkin, *Emmelesia albulata*, Schiff., bred from pupæ received from Shetland, 1888, and stated that in 1889 four only were bred, while in 1890 upwards of twenty emerged, including var. *griseata*, Stgr., and var. *thules*, Weir. Mr. Adkin also exhibited *Cedestis gysselinella*, Dup., pupa in drawn-together fir needles; and *Lithocolletis vacciniella*, Scott, larvæ mining under side of leaves of *Vaccinium*, both species from Rannoch. Mr. Tugwell, *Larentia olivata*, Bork., from Portland. Mr. Billups, the three cabinet drawers of life-histories shown by him at the Annual Exhibition, and made remarks thereon; also pupa and imago of *Eulophus damicornis*, Kirby, bred from *Demas coryli*, L., by Mr. Symes; *Cetonia aurata*, L., showing the position of the species in the cocoon after its change from the larval stage; and on behalf of Mr. Mansbridge, galls on *Hieracium* and birch collected near Leeds. Mr. Billups expressed an

opinion that the maker of the former was *Aulax hieracii*, Bouch., and probably the galls on the birch were made by a species of *Phytoptus*.

May 14th.—The President in the chair. Messrs. H. Rowland-Brown, B.A., F.E.S., of Harrow-Weald; G. Bird, of Honor Oak; F. E. Filer, of Southwark; G. W. Ruffle, of Camberwell; A. E. Dewey, of Walham Green; and A. C. Forrester, of Clapham; were elected members. Mr. Tugwell exhibited, on behalf of Mr. J. E. Robson, of Hartlepool, a box containing varieties of the underside of *Lycena icarus*, Rott., *L. astrarche*, Bgstr., and *Vanessa atalanta*, L., varieties of *V. urticae*, L., *Cænonympha pamphilus* var. *albescens*; a long varied series of *Abraxas ulmata*; also a dark *Colias hyale*, L. Mr. Tugwell also showed, on behalf of Mr. Collins, of Warrington, a dark specimen of *Aplecta nebulosa*, Hufn.; an extremely dark form of *Acronycta rumicis* var. *salicis*, Curt.; and a variety of *Leucania lithargyria*, Esp., with almost white under-wings and a strongly marked black band. Mr. Jäger, living larvæ of *Callimorpha hera*, L., reared from ova obtained from a specimen captured in South Devon, 1890. Mr. R. Adkin, *Noctua festiva*, Hb., from Forres, Isle of Unst, North Wales and Kent. Mr. Tugwell, bred specimens of *Lobophora viretata*, Hb. The Secretary read a letter from Mr. Merrifield, and extracts from his papers on the effects of temperature on the colouring of certain species of Lepidoptera, the consideration of which stood over until a subsequent meeting. Mr. Tutt contributed a paper, "Reproduction and Parthenogenesis."

The Annual Exhibition was held on April 15th and 16th, at the "Bridge House," London Bridge, S.E., and was more successful than any previous exhibition of this Society: it included all branches of the animal and vegetable kingdoms. Among the exhibitors were Messrs. Geo. Neighbour and Son, with bees, beehives and appliances. Mr. H. Moore and Mr. A. E. Cook, fine collection of nests of British and foreign wasps. Mr. Billups showed Hymenoptera, Heterogyna, and Fossorial, following in their natural order; British Coleoptera, showing most of the known families; and Diptera, and Hemiptera Homoptera. Among Mr. Billups's exhibits were three drawers showing the life-histories of various species of Lepidoptera, with the parasites, both hymenopterous and dipterous, many of which were new to Britain, and in some cases new to science; the majority of these parasites were reared by members of the Society during the past four years. Mr. Lewcock and Mr. Goodman, cases of Coleoptera. Mr. W. Manger, Exotic Coleoptera, &c. Mr. R. McLachlan, British Trichoptera, or Caddisflies, with cases of the larvæ. Mr. W. West, Homoptera collected in 1890. The most interesting exhibits among the Lepidoptera were those of Mr. Tugwell, who showed the Sphingidæ, including fine varieties of *Deilephila galii* and *Chærocampa porcellus*; the Bombyces, fine series of varieties of *Spilosoma lubricipeda*, *S. menthastri*, and *Arctia caia*. Mr. South, the Pieridæ, showing considerable variation among the different species; fine varied series of *Boarmia repandata* and *Cidaria truncata*; the genus *Dianthæcia*; also a small collection of Micro-lepidoptera, arranged in a new, and, as suggested, more convenient method, viz., side by side in series of about half a dozen specimens. Mr. McArthur, a small case illustrating the life-history of *Pachnobia hyperborea*, Zett., *alpina*, Westw.; also cases of Lepidoptera. Mr. J. H. Leech, a large collection of Palæarctic species, including Papilionidæ, Sphingidæ, and the genus *Arctia*. Mr. Gregson, a most interesting case of varieties of *Abraxas grossulariata*. A collection of Canadian species made by Messrs. A. and L. Gibb, and which had been arranged by the curator, Mr. West, were shown by the Society. Life-

histories of many species were exhibited by Mr. Short, Mr. C. H. Williams, and Mr. A. J. Croker, *Phorodesma smaragdaria* and *Miana strigilis* being specially noticeable; and also by Mr. Quail, whose specimens, mounted on the natural food-plant, were much admired. Mr. Sydney Webb exhibited long series of varieties of *Vanessa urticae* and *Abraaxas grossulariata*, Mr. Hawes, varieties of *Rhopalocera*, and a long series of *Hesperia lineola*, including the three specimens taken in 1888, from which the species was identified. Mr. T. W. Hall, varieties of *Noctuæ*. Mr. J. R. Wellman, his magnificent collection of *Plusiidæ* and *Acidaliiidæ*. Mr. J. T. Williams, long series of many species. Professor Stuart, examples of mimicry among *Lepidoptera*; and a case showing secondary sexual characters. Mr. C. B. Smith, fine series of the genus *Argynnis*. Mr. R. Adkin, the British butterflies geographically arranged, in order to show local variation; also long series of the genus *Triphæna*. Mr. S. J. Capper, a fine lot of varieties and typical specimens of *Cænonympha davis*. Mr. C. A. Briggs, long and varied series of the *Pieridæ* and other groups. Mr. C. Fenn, varieties of *Taniocampa incerta*, and examples of *Tortrices*. Mr. A. H. Jones, scarce British *Noctuæ*. Mr. J. W. Tutt, his collection of the genus *Agrotis*. Messrs. Nussey, Collins, Joy, Barker, and many others, also exhibited British *Lepidoptera*, while fine exhibits of exotic species were made by Mr. Jenner Weir and Mr. S. Edwards. Mr. Mosley contributed an interesting collection of insects injurious to agriculturists, &c. Botanical exhibits were made by Mr. E. Step (British lichens and mosses), Miss Billups, Miss Adkin, Messrs. A. L. Clarke, and C. S. Cooper; minerals by Mr. Russell; and Mr. M. Winkley exhibited a collection of Queensland opals, showing fossil bones, shells, &c., opalised, the whole of which were collected by Mr. T. C. Wollaston. Entomological objects under the microscope were exhibited by the undermentioned gentlemen:—Messrs. H. J. Turner, A. J. Croker, T. R. Billups, R. Adkin, E. Hinton, E. Dadswell, F. Coles, R. Macer, T. D. Ersser, A. L. Corbett, H. G. Coombs, C. S. Bouttell, J. T. Holder, H. Groves, W. West, W. B. Medland, F. Reeve, W. Gregory & Co., F. Enock, C. H. Oakden, and C. S. Cooper. In a separate room Mr. Henry Burns exhibited pond life, the enlarged image of the living object being thrown upon a screen by aid of a lantern. On each evening Mr. F. Enock delivered a lecture on "The Wonders of Insect Life, as exemplified in the Life-history of the Hessian Fly"; and Mr. G. Day lectured on "A Walk by the Sea Shore"; both of these were illustrated by means of the oxy-hydrogen lantern. Mr. George Smith, of the Sciopticon Company, also gave exhibitions of micro-photographs.—H. W. BARKER, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—*April 6th, 1891.*—Mr. R. C. Bradley in the chair. Mr. C. J. Wainwright showed long series of *Cheilosia æstracea* and *Volucella pellucens*, the former from Somersetshire, the latter from several localities. Mr. R. C. Bradley, *Echinomyia grossa* and *fera*. Mr. H. J. Sands, a piece of ebony completely destroyed by some large larvæ.

April 20th.—Rev. C. F. Thornehill, F.E.S., Vice-President, in the chair. Dr. Stacey Wilson was elected a member of the Society. Mr. R. C. Bradley showed *Lauxania cylindricornis* from Wyre Forest and *Lanea* from Trench Woods. Mr. A. Johnson showed larvæ of *Chunda lichenea*. The Secretary read a paper on "Urtication," which was communicated by Mr. R. Freer. He described the effects which the hairs of *Porthesia similis*, *Bombyx rubi*, and other *Lepidoptera*, in various stages, produced, and said he concluded from them that the irritation was caused

mechanically and not by poison. After describing in detail the hairs of the larva of *Porthesia similis*, and referring to the hairs of *Attacus cecropia* and *Pterophoridae*, he said that careful examination of all these had led him to conclude that the hairs which caused the irritation were not true hairs, but degenerate weapons of offence and defence. A discussion followed, in which Messrs. Thornehill, Pope, Harrison and C. J. Wainwright joined.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY.—*May 11th.* The President, S. J. Capper, F.L.S., F.E.S., in the chair. Reports were read by the Secretaries of the District Records Committee, which showed that the lists of the various orders were progressing, but the Secretaries hoped, in order to make them as complete as possible, that they would obtain the assistance and co-operation of all entomologists who had done work in either of the two counties. A paper "On the habits of some species of the Hymenoptera-Aculeata," by Robert Newstead, F.E.S., was read, the author exhibiting several cases of Hymenoptera and two species of *Bombus*, *in situ*, stuck on thorns, said to be done by the butcher-bird. The President exhibited *Cicada anglica* from the New Forest. Mr. Stett, varieties of several species of *Noctua*. Mr. Day exhibited and explained a new setting board (Day and Newstead's patent), which, by the use of glass slips, it is claimed, enables the wings to be set accurately and without disturbing the scales. The next meeting of the Society will be on Monday, September 14th.—F. N. PIERCE, *Hon. Sec.*

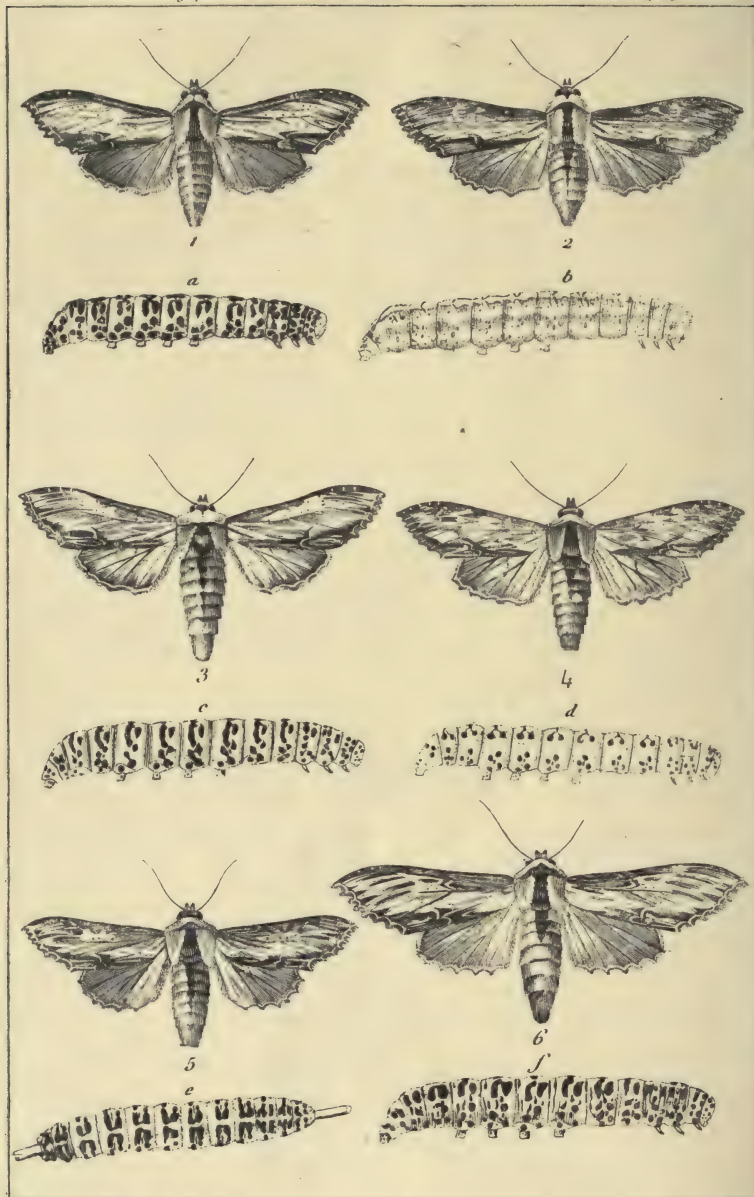
REVIEW.

Abstract of Proceedings of the South London Entomological and Natural History Society for the years 1888 and 1889. 210 pp. 1 plate.
London: The Society's Rooms, Hibernia Chambers, London Bridge.

The present 'Abstract' forms a very respectable volume as regards bulk, and its contents are instructive, interesting, and comprehensive. In the Presidential Addresses will be found an exhaustive summary of the entomological events of the years 1888 and 1889, together with some observations on the additions to literature during those years. Among many notes and papers of greater or lesser importance are the following:—"Remarks on *Acidalia marginepunctata*," by R. Adkin; "Speculations on the probable origin of the genus *Anthocharis*," by T. D. A. Cockerell; "On the apparent thickening of veins in *Argynnis paphia*," by J. J. Weir; "On the probable origin of *Gonopteryx rhamni*," by J. J. Weir and T. D. A. Cockerell; "Pupation of *Chærocampa porcellus*," by R. Adkin; "Colour of *Pieris napi* chrysalids affected by surroundings," by J. J. Weir; "Remarks on breeding *Retineu resinella*," by R. Adkin; "Practical Hints on breeding Macro-Lepidoptera," by W. H. Tugwell; "Ichneumonidæ bred during the years 1887 and 1888, by members of the Society," by T. R. Billups; "Nature's Sanitary and Anti-Sanitary Services," by J. W. Slater.

Space will not permit further reference to the contents of this volume, but the items we have noticed are a fair sample, and afford evidence of the valuable work the Society is doing.

Although styled the South London Entomological and Natural History Society, we note that many of its members reside in the provinces. Probably advantages might accrue if the Society adopted a shorter title, and one more in accord with its widely distributed membership.



Lambert et Blanchard pinx.

Duprèl sculp.

N° 1 a. *Cucullia Serophulariæ* et sa Chenille. 2 b. *C. Thapsiphaga* id. 3 c. *C. Lychitis* id.
4 d. *C. Serophulariphaga* id. 5 e. *C. Caninæ* id. 6 f. *C. Verbasæ* id.

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[No. 338.]

CUCULLIA VERBASCI AND ITS ALLIES.

BY RICHARD SOUTH.

PLATE III.

THE insect known as *Cucullia scrophulariæ* has always been an enigma to me, and I was therefore exceedingly glad to see the question of its identity brought forward by Mr. Dale (Entom. 123). In a paper on the Lepidoptera of the Isle of Corsica (Ann. Soc. Ent. Fr. 1833), Rambur discusses certain species of the genus *Cucullia* allied to *C. verbasci*. In his opening remarks upon the genus, Rambur says that it is certainly a most natural one, but that it is exceedingly difficult to distinguish the numerous species comprised therein. As it is almost impossible to separate *Acronycta psi* from *A. tridens* without reference to the larvæ of those species, so also will confusion ensue in the identification of certain species of *Cucullia*, unless one has an intimate knowledge of their respective larvæ. After referring to the errors in determination of former authors, Rambur proceeds to give a kind of monograph of the *verbasci* group of the genus, illustrated by figures of the larva and imago of each of the six species described. As the volume containing this paper may not be accessible to many lepidopterists in this country, I have had the plate reproduced by photo-lithography.

The six species of *Cucullia* allied to *C. verbasci*, treated of and figured by Rambur in his monograph of the group, may be placed in two sections as follows :—

- | | |
|--------------------------------|--|
| (a) <i>C. verbasci</i> , Linn. | (b) <i>C. thapsiphaga</i> , Treit. |
| <i>C. scrophulariæ</i> , Cap. | <i>C. caninæ</i> , Ramb. (= <i>blattariæ</i> , |
| <i>C. lychnitis</i> , Ramb. | Esp.) |
| | <i>C. scrophulariphaga</i> , Ramb. |

We are not, however, immediately concerned with section (b),
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as the species comprised therein appear distinct enough from section (a), and, moreover, have not so far been detected in Britain. The following remarks upon the insects enumerated in section (a) are mainly founded on a study of Rambur's paper :—

CUCULLIA VERBASCI (fig. 6).

The imago is so well known that it is, perhaps, unnecessary to say anything about its colour or markings.

The larva is found on all kinds of *Verbascum*, also on *Scrophularia canina*, *S. ramosissima*, and *S. aquatica*. It is the only species of *Cucullia* which seems to feed on *V. thapsus*, and also the only one which would appear to prefer the leaves to the flowers; often hides beneath the leaves, and is met with from May until about the end of August. The imago chiefly emerges in May.

Guenée gives March and April as the month for the imago; Stainton, the end of April and May; Newman, April; Kirby, April and May; Hofmann, May.

CUCULLIA SCROPHULARIÆ (fig. 1).

Compared with *C. verbasci*, *C. scrophulariæ* is always smaller, and there is more yellow and less brown in the composition of its colour; the costal margin of the fore wings is ashy brown, or, in some specimens, blackish; the black dots above the median nervure are deeper in colour and more conspicuous; the inner margin is brown, but the crescents are less whitish. The cowl or hood is bordered with reddish brown, never with red.

The larva bears a strong resemblance to that of *C. verbasci*, but it is always much smaller; there is a dorsal series of large yellow patches, upon each of which four black spots are placed; the two posterior black spots are longer, sometimes touching the black spot placed just above the spiracle; they are always united, and often also with the anterior pair, thus forming a kind of X; the four spots on the sides are rather large; the other black markings are pretty much as in *C. verbasci*. The head is deep yellow, with a frontal black mark shaped like an inverted V. It feeds on the flowers and seeds of *Scrophularia nodosa*, *S. aquatica*, *Verbascum blattaria*, and *V. blattaroides*.

The species is widely distributed, though less common than *C. verbasci*. It is found in Germany and France, rather more frequently met with in the south, occurring about the same time as *C. verbasci*.

Guenée compares *C. scrophulariæ* with *C. verbasci*, and says that it is nearly as common as that species, and occurs at the same time; this, according to him, would be March and April. Stephens, Doubleday, Stainton, Newman, and others mention May.

Duponchel (Hist. Nat. Lep. vii. pl. 124) gives two very different figures of this species; his fig. 3 represents a pale

ochreous-brown insect, clouded with grey on the basal area, dotted with black on the costal area, and dashed with dark grey on the outer marginal area; there are three dark equidistant spots on the costa towards apex, and a reddish brown streak, interrupted by a double crescent mark, along inner margin. This figure bears a very strong resemblance to his fig. 4, which represents *C. thapsiphaga*. Referring to fig. 3, Duponchel says, in the third volume of his Supplement, that it was a mistake to call it *scrophulariæ*, as it really was a variety of *C. caninæ*. Staudinger, however, appears to consider that it represents *C. scrophulariæ*. The other figure referred to is given in vol. iii. Suppl. p. 37, fig. 1, and represents a dark ochreous insect, with a dark reddish-brown streak along the inner margin, and two dashes of the same colour above the middle of the outer margin. This is also referred by Staudinger to *C. scrophulariæ*.

CUCULLIA LYCHNITIS (rect. *lychnitidis*, Staud.), (fig. 3).

This species is still farther removed from *C. verbasci* than is *C. scrophulariæ*, but it is also very close to the last-named species, with which it agrees in size, but the wings are rather less broad. In colour it is of a pale reddish yellow; the costal margins of the fore wings are grey-brown, slightly tinged with reddish; the clear whitish space above the crescents, which are of the ground colour, is sometimes conspicuous; the inner marginal streak is less deep, the clear space near inner angle is larger, and the line which precedes it is well defined at this point; the orbicular is enclosed by four black dots indicating a square; the reniform is also enclosed by black dots, which vary in number from two to three on its inner side, and from four to six on its outer side. The hind wings are paler. The cowl is posteriorly bordered with ashy brown.

The larva is similar to that of *C. scrophulariæ*. Each segment has a semicircular yellow band, upon which are placed black spots; the two posterior spots, often united, are longer and more slender, frequently joining the spot above the spiracle; the two intermediate spots on the sides of the segments are also often united, forming oblique lines. A variety occurs which is almost entirely yellow, with the black spots more or less obsolescent.

Feeds on the flowers and seeds of *Verbascum lychnitis*, *V. sinuatum*, *V. nigrum*, and *V. phlomoides*.

This species assumes the perfect state much later than the other two, as it is not on the wing before July and August, according to Rambur; but in England, I think, the moth appears in June and July.

Var. (?) *rivulorum*, Guen., is larger and more ochreous in colour. It occurs in France, and the larva, which is greener in colour, is said to feed on *Scrophularia* only.

Mr. Harwood, writing of *C. scrophulariæ* in 1876 (Entom. ix. 233), pointed out that the species ought not to be confounded with *C. verbasci*, but adds that it is extremely difficult to distinguish between *C. scrophulariæ* and *C. lychnitis*; and on p. 259 of the same volume he quotes a letter received from the late Mr. Henry Doubleday in 1870, which shows that at that time few English entomologists were acquainted with the insect called *scrophulariæ*. Mr. Robson also considers that *scrophulariæ* "more closely resembles *lychnitis* than *verbasci*" (ante, p. 145). Between thirty and forty years ago, Speyer suggested that *lychnitis* was only a form of *C. scrophulariæ*, a view of the case which has been accepted by other continental entomologists, and Mr. Dobree's remarks upon this subject (Entom. 146) would seem to indicate that he also holds this opinion. Possibly, however, *scrophulariæ* may be a form of *C. verbasci*, and this seems the more probable when we compare Rambur's figures of the respective larvæ, and attach a due amount of importance to the facts that the larva of *C. lychnitis* feeds only on *Verbascum*, whilst those of *C. verbasci* and *C. scrophulariæ* feed on both *Verbascum* and *Scrophularia*, and the imagines of the last two emerge about the same time. Is it too much to hope that those lepidopterists who have the opportunity of conducting such investigations, will be indefatigable in their endeavour to clear away the cloud of doubt and uncertainty which seems to envelope this mysterious "shark?"

A PRELIMINARY LIST OF THE INSECT-FAUNA OF MIDDLESEX.

COMPILED BY T. D. A. COCKERELL.

(Continued from p. 143.)

Subf. *Noctuinae* (sens. str.).

Agrotis puta, Hb., Hampstead; Bishop's Wood; Clutterhouse Lane; Old Oak Common (*Godwin*); Mill Hill, at sugar (*South*); Harefield (*Wall*); Chiswick (*Sich*). *A. ypsilon*, Rott., = *suffusa*, Hb., Hampstead; Clutterhouse Lane (*Godwin*); Mill Hill, at sugar (*South*); Hammersmith (*Mera*); Harefield (*Wall*); Clapton (*Bacot*); Chiswick (*Sich*). *A. saucia*,* Hb., Hampstead, some seasons scarce, others in dozens (*Godwin*); Mill Hill, at sugar (*South*); Chiswick (*Mera*). *A. segetum*, Schiff., Mill Hill (*South*); Tufnell Park (*Shepherd*); Hampstead (*Watts*); Harefield, usually common (*Wall*); Chiswick (*Sich*). *A. exclamationis*, L., generally distributed (*Godwin*); Mill Hill (*South*); Bedford Park (*Miss E. Sharpe*); Tufnell Park (*Shepherd*); Hammersmith (*Mera*); South Hampstead (*Watts*); Harefield (*Wall*); Dalston (*Prout*).

* *A. saucia* is placed by Prof. J. B. Smith in the genus *Peridroma*, Hb.

A. corticea, Hb., South Hampstead, common (*Watts*); Clapton (*Bacot*). *A. nigricans*, L., very abundant. Elgin Road (*Godwin*); Mill Hill (*South*); Holloway (*Shepherd*); Hammersmith (*Mera*); South Hampstead (*Watts*); Chiswick, once (*Sich*). *A. tritici*, L., Mill Hill, at sugar (*South*); Chiswick, occasionally (*Sich*). *A. strigula*, Thnb., Harefield, one taken, 1887 (*Wall*).

Noctua glareosa, Esp., Bishop's Road, at sugar, rare (*Godwin*). *N. augur*, Fb., Mill Hill, at sugar (*South*); Highgate (*Mera*); Hampstead (*Watts*); Harefield, common (*Wall*). *N. plecta*, L., on lamps, Finchley Road; Willesden (*Godwin*); Mill Hill (*South*); Bedford Park (*Miss E. Sharpe*); Hammersmith (*Mera*); South Hampstead (*Watts*); Harefield (*Wall*); Clapton (*Bacot*). *N. c-nigrum*, L., on lamps, Finchley Road; Willesden (*Godwin*); Mill (*South*); Hammersmith (*Mera*); Harefield, taken rarely (*Wall*); Clapton (*Bacot*); Chiswick, larva on dock (*Sich*). *N. ditrapezium*, Bork., Bishop's Wood (*Godwin*). *N. triangulum*, Hufn., Bishop's Wood; Kingsbury, Old Oak Common, fairly common at sugar, more so on lamps (*Godwin*); Mill Hill, at sugar, and larvæ on sallow (*South*); Harefield (*Wall*). *N. brunnea*, Fb., Bishop's Wood, common (*Godwin*); Mill Hill (*South*); Highgate (*Mera*). *N. festiva*, Fb., Bishop's Wood; Fulham; Old Oak Common (*Godwin*); Mill Hill (*South*); Highgate (*Mera*); Harefield, very common (*Wall*); Chiswick, at sugar (*Sich*). *N. rubi*, View., Bishop's Wood (*Godwin*); Mill Hill—in some seasons there are two broods, one appearing in June and the other in August, the individuals in the later brood are more numerous, but smaller in size—(*South*); Hampstead, common (*Watts*); Harefield, taken rarely (*Wall*); Stamford Hill and Tottenham dist. (*Prout*); Chiswick, at sugar (*Sich*). *N. umbrosa*, Hb., Finchley Road; Kilburn (*Godwin*); Mill Hill (*South*). *N. baia*, Fb., Mill Hill, at sugar (*South*); Highgate (*Mera*); Harefield (*Wall*). *N. castanea* var. *neglecta*, Hb., Bishop's Wood, fairly common (*Godwin and Shepherd*). *N. xanthographa*, Fb., generally distributed (*Godwin*); Mill Hill (*South*); Isleworth (*Fenn*); Bedford Park (*Miss E. Sharpe*); Bishop's Wood (*Shepherd*); Highgate (*Mera*); Harefield (*Wall*); Clapton (*Bacot*); Chiswick, abundant, larva under stones, &c., in spring, eats *Rumex*, *Poa annua*, &c. (*Sich*).

Triphæna ianthina, Esp., Bishop's Wood; Clutterhouse Lane; Old Oak Common (*Godwin*); Mill Hill (*South*); Isleworth (*Meyers*); Highgate (*Mera*); Harefield (*Wall*); Chiswick, larva in spring (*Sich*). *T. fimbria*, L., Bishop's Wood, larvæ plentiful; Clutterhouse Lane; Old Oak Common, rare (*Godwin*); Mill Hill (*South*). *T. interjecta*, Hb., Mill Hill, at sugar and at honey-dew (*South*); Chiswick, occasionally (*Sich*). *T. comes*, Hb., generally distributed* (*Godwin*); Mill Hill* (*South*); Bedford Park (*Miss E. Sharpe*); Bishop's Wood* (*Shepherd*); Highgate* (*Mera*); South Hampstead (*Watts*); Harefield (*Wall*); Clapton* (*Bacot*); Chiswick,

* Cited in the MS. list as *orbana*.

larva on primrose, &c. (*Sich*). *T. pronuba*, L., generally distributed (*Godwin*); Mill Hill (*South*); Isleworth (*Fenn*); Bedford Park (*Miss E. Sharpe*); Bishop's Wood (*Shepherd*); Highgate (*Mera*); South Hampstead (*Watts*); Harefield (*Wall*); Clapton (*Bacot*); Dalston (*Prout*).

Subf. *Amphipyriinæ*.*

Amphipyra pyramidea, L., Bishop's Wood, common; Clutterhouse Lane; Kingsbury (*Godwin*); Mill Hill, at sugar (*South*); Harefield (*Wall*). *A. tragopogonis*, L., Clutterhouse Lane; Old Oak Common; Fulham, rare (*Godwin*); Mill Hill, at sugar (*South*); Isleworth (*Fenn*); Bedford Park (*Fenn*); Tufnell Park (*Shepherd*); Harefield, frequent (*Wall*); Clapton (*Bacot*); Chiswick, larva on *Galium aparine* (*Sich*).

Mania typica, L., generally distributed (*Godwin*); Mill Hill (*South*); Bedford Park (*Ckll.*); Tufnell Park (*Shepherd*); Hammersmith (*Mera*); larvæ very abundant at South Hampstead (*Watts*); Harefield (*Wall*); Clapton (*Bacot*); Dalston (*Prout*). *M. maura*, L., Bishop's Wood; Clutterhouse Lane; Old Oak Common; Fulham; Regent's Park; Kilburn (*Godwin*); Mill Hill (*South*); Isleworth (*Miss Cooper fide Fenn*); Hampstead (*Watts*); Harefield (*Wall*); Clapton (*Bacot*); Chiswick, larva once in spring (*Sich*).

Subf. *Orthosiinæ*.†

Pachnobia rubricosa, Fb.,† Mill Hill, at plum blossom (*South*); Chiswick, at willow (*Sich*).

Tæniocampa gothica, L., generally distributed (*Godwin*); Mill Hill, at plum blossom (*South*); Hammersmith (*Mera*); Hampstead (*Watts*); Harefield (*Wall*); Chiswick, at willow (*Sich*). *T. incerta*, Hufn., generally distributed (*Godwin*); Mill Hill, at plum blossom (*South*); Bishop's Wood (*Shepherd*); Hammersmith (*Mera*); Hampstead (*Watts*); Harefield (*Wall*); Clapton (*Bacot*); Chiswick, at willow, larvæ on nut, willow, and hornbeam (*Sich*). *T. populeti*, Fb., Rickmansworth (*South*). *T. stabilis*, View., generally distributed (*Godwin*); Mill Hill, at plum blossom (*South*); Hampstead (*Watts*); Harefield (*Wall*); Chiswick, at willow (*Sich*). *T. gracilis*, Fb., Mill Hill, at plum blossom (*South*); Harefield, frequent (*Wall*); Chiswick, at willow (*Sich*). *T. miniosa*, Fb., Bishop's Wood (*Godwin*). *T. munda*, Esp., Bishop's Wood, common (*Godwin*); Mill Hill, at plum blossom (*South*); Harefield (*Wall*). *T. pulverulenta*, Esp., generally distributed (*Godwin*); Mill Hill, at plum blossom (*South*); Bishop's Wood (*Shepherd*); Hampstead (*Watts*); Harefield (*Wall*).

* Grote classes *Amphipyra*, which he calls *Pyrophila*, Hubn., in the tribe *Caradrini*.

† Including the *Cosmiidæ* of Guenée.

‡ Perhaps a *Tæniocampa* rather than a *Pachnobia*.

Orthosia upsilon, Bork., Fulham; Hammersmith Marshes, site of Addison Road Station; Kensal Green; Clutterhouse Lane (*Godwin*); Mill Hill (*South*); Tufnell Park (*Shepherd*). *O. lota*, Clerck, Bishop's Wood; Clutterhouse Lane; Hammersmith; Kingsbury (*Godwin*); Mill Hill, at sugar on juniper and yew bushes (*South*); Harrow, 1881 (*Watts*); Harefield (*Wall*); Chiswick, larva on willow (*Sich*). *O. macilenta*, Hb., Bishop's Wood; Clutterhouse Lane (*Godwin*); Mill Hill, at sugar on juniper and yew bushes (*South*); Highgate (*Shepherd*); Chiswick (*Mera*); Harefield (*Wall*).

Anchocelis rufina, L., Bishop's Wood (*Godwin*); Harefield, once taken by Mr. Kennell (*Wall*). *A. pistacina*, Fb., generally distributed (*Godwin*); Mill Hill (*South*); Isleworth (*Fenn*); Highgate (*Shepherd*); Hammersmith (*Mera*); Harefield (*Wall*); Chiswick, once (*Sich*). *A. lunosa*, Haw., generally distributed, at lamps (*Godwin*); Mill Hill (*South*); Highgate (*Shepherd*); Hammersmith (*Mera*); larvæ at South Hampstead (*Watts*); Harefield (*Wall*); Clapton (*Bacot*); Chiswick, larva obtained by sweeping grass in March (*Sich*). *A. litura*, L., generally distributed (*Godwin*); Mill Hill (*South*); Harefield, common (*Wall*); Chiswick, larva on sorrel (*Sich*).

Cerastis vaccinii, L., Bishop's Wood, common (*Godwin*); Mill Hill, at sugar on juniper and yew bushes (*South*); Highgate (*Shepherd*); Harefield, very abundant (*Wall*). *C. spadicea*, Auctt. Angl. = *ligula*, Esp., Bishop's Wood, common (*Godwin*); Mill Hill (*South*); Highgate (*Shepherd*); Harefield (*Wall*).

Scopelosoma satellitia, L., Bishop's Wood, common; and generally distributed (*Godwin*); Mill Hill (*South*); Harefield (*Wall*); Chiswick (*Sich*).

Oporina croceago, Fb., two specimens at sugar, Old Oak Common, 1875 (*Godwin*).

Xanthia citrigo, L., Mill Hill (*South*); Highgate (*Shepherd*). *X. fulvago*, L., Bishop's Wood, common (*Godwin*); Mill Hill (*South*); Harefield, common some seasons (*Wall*). *X. flavago*, Fb., Bishop's Wood, common (*Godwin*); Mill Hill (*South*); Harefield, common some seasons (*Wall*). *X. aurago*, Fb., Mill Hill (*South*); one specimen at South Hampstead (*Watts*); Harefield, taken sparingly (*Wall*). *X. gilvago*, Esp., Mill Hill (*South*); Harefield, two taken, 1889 (*Wall*). *X. circumcellaris*, Hufn., Bishop's Wood, common (*Godwin*); Mill Hill (*South*); Highgate (*Shepherd*); Harefield, abundant (*Wall*).

Cirrhædia xerampelina, Hb., Clutterhouse Lane, a larva under moss on ash (*Godwin*); Mill Hill (*South*).

Tethea subtusa, Fb., Willesden Lane; Neasdon, rare (*Godwin*); Mill Hill, at honey-dew on plum trees (*South*); Hammersmith (*Mera*); South Hampstead, common in garden, 1875, &c., not seen since 1880 (*Watts*). *T. retusa*, L., Mill Hill, at honey-dew on plum trees (*South*).

Cosmia paleacea, Esp., Highgate Woods, 1870 (*F. Bartlett*, Entom., 1878, p. 104).

Dicycla oo, L., one larva near Ealing (*Mera*).

Calymnia trapezina, L., generally distributed (*Godwin*); Mill Hill (*South*); Isleworth (*Fenn*); Bishop's Wood (*Shepherd*); near Acton (*Mera*); Hampstead (*Watts*); Harefield (*Wall*); Dalston (*Prout*); Chiswick, larva on oak, holly, &c. (*Sich*). *C. pyralina*, View., Mill Hill, at sugar, also bred (*South*). *C. diffinis*, L., Clutterhouse Lane; Bishop's Wood (*Godwin*); Mill Hill (*South*); near Acton (*Mera*); Harefield (*Wall*). *C. affinis*, L.,* West Hampstead (*Godwin*); Mill Hill (*South*); Isleworth (*E. M. Fenn* fide *F. G. Fenn*); Highgate, 1865 (*Shepherd*); near Acton (*Mera*); Hampstead Heath, Aug. 20th, 1881 (*Watts*); Harefield, not common (*Wall*); Chiswick (*Sich*).

(To be continued.)

ENTOMOLOGY OF GRANADA AND NEIGHBOURHOOD.

BY THE REV. F. A. WALKER, D.D., F.E.S.

My chief places of resort at Granada, in the pursuit of Entomology, were the beds of dry water-courses situate between the Alhambra Hill and the Campo Santo. The steep craggy banks by which these water-courses were hemmed in, to a height of twelve or fifteen feet, rendered the locality warm, sheltered, and therefore suitable for the purpose. I likewise visited the olive groves left and right of the said channels for the winter floods from the Sierra Nevada, those to the left consisting of steep slopes, while those to the right were situate on much more level ground. The undergrowth of these olive groves consisted of a varied and luxuriant flora of borage, echium, field poppy, corn marigold, wild camomile, a deep pink convolvulus, &c. These species were by far the most abundant, and in addition may be enumerated the less frequent but also plentiful occurrence of variously coloured vetches, two species of mignonette, star of Bethlehem, wild coreopsis and antirrhinum, with many more.

Following the road from the Alhambra Hill to the cemetery, *Xylocopa violacea*, the commonest species of all the Hymenoptera there, with the exception, as a matter of course, of *Apis mellifica*, might be noticed humming noisily round the blossoms of the white acacia trees, which were just in perfection during the first fortnight of May, a period of glorious weather. The rose and purple acacias on the Alhambra terrace were likewise affected by this bee, but these varieties are far less common than their white congener. As regards Vespidae, our own *Vespa germanica* was

* Mr. South has taken all the four species of *Calymnia* on one night.

observed, as a rule, every day, but would not appear to be plentiful. Probably the two commonest kinds were (1) the slight and elegant *Polistes gallicus*; the length of the legs of this species is remarkable, and very observable when flying; and (2), *Dielis aurea*, about the size and shape of our commonest wasp, but with the yellow replaced by a rust-coloured tint. The flower on which I captured most of the last-named species was a chrysanthemum or marguerite in the large and picturesque garden of the Villa Calderon, whose owner, the Marquis Pallavicini, is an absentee residing in Genoa. Ants (of three or four species) were most abundant, and it was a very common sight to see dead leaves and fallen blossoms of the white acacia toppling about as if bewitched, or moving erect, like the sail of a boat, owing to an ant pertinaciously grasping one end, and so dragging them along. In respect of Neuroptera, the commonest species was *Libellula depressa*, of which more specimens of the female were observed than of the male. The chief locality for this insect was a ditch of swiftly-flowing water, overhung in places by dog-roses, brambles, and honeysuckles, by the side of a road that diverged to the left of the road mentioned above, at a point about half-way between the Alhambra and the cemetery; in fact, *L. depressa* was practically the only dragon-fly, as the genus *Lestes* was only represented among my insects by two specimens, one that I captured, and the other given to me, and I do not remember seeing any more. Three or four specimens only of a species of *Æschna* were observed, one flying backwards and forwards along the bed of the dry water-course, a second above the reeds and mud of an old Moorish reservoir in the side of the hill. These two, as far as I could judge, were of a uniform dun-colour, with a tinge of blue about the thorax. Two more had a body of a uniform lavender-blue, of very much the same colour as the male of *depressa*, and, I believe, with a little green and yellow about the thorax. These two last were flying around the trenches and remaining relics of the Moorish waterworks or forts at the top of the hill, not far from the Sella del Moro, or Seat of the Moor, the brick-walled platform where Boabdil is traditionally reported to have mourned as he took a last bird's-eye view of the glories of his departing kingdom, one of the fairest prospects on earth; Granada and its Vega outspread beneath. Whether the above-named specimens of *Æschna* were two different kinds, or the two sexes of the same kind, is more than I can say; they were far too restless, as well as swift on the wing, to admit of being caught, and were, I should judge, rather smaller in size than our common *Æschna cyanea*, probably *mauricianus*. Other tribes of Neuroptera were likewise to all appearance scantily represented. I took one specimen of *Sialis lutaria*, and one of *Chrysopa*.

Among the Coleoptera may be mentioned *Clythra vicina* (which

was very common), *Ænas crassicornis*, and *Trichodes octopunctatus*. These beetles used to cluster on the leaves and shoots of the bramble on a bright and hot day. *Oxythyrea stictica* and *Cetonia squalida* and *hirtella* were also common. I secured a few specimens of *Cetonia aurata* on flowers in the garden of the Villa Calderon, two or three specimens of the genus *Telephorus* from flowers under the olive groves; one or two specimens of *Scarabæus sacer* that were crawling around refuse in the road; one or two examples of *Silpha* on a singularly beautifully-marked, but dead and well-nigh putrid, lizard near the Seat of the Moor; an immature representative of a species of *Lacerta* that reaches a very large size. The most abundant kind of all was a dark beetle with a red thorax, on the flower of the wild camomile, and which I have since ascertained to be *Heliotaurus ruficollis*.

In taking a review of the Diurnal Lepidoptera, several of our common British species were observed, but could not be pronounced abundant. For example, on a fine and hot morning one or two specimens of *Pieris brassicæ*, *Epinephele ianira*, *Satyrus megæra*, *Vanessa urticæ*, *V. cardui*, and *Chrysophanus phlæas* might be seen; *P. rapæ* even more rarely. *V. atalanta* was occasionally seen, but high up, as a rule, amid the elms of the wood that covers the Alhambra Hill. During the first few days of May, *V. cardui* was only represented by worn, hibernated specimens, but before the close of the month I noticed two or three examples, fresh and in good condition. *Papilio machaon* and *P. podalirius* were seen and captured, but neither of these two butterflies were common. Of *Colias hyale* I saw and took one solitary specimen. *Colias edusa* and *Euchlœ eupheno* were fairly common, I mean so far as seeing two or three specimens of each nearly every day. The former species was, I think, rather commoner at Langaron (a place famed for its mineral waters, four hours distant from Granada by diligence, and on the south side of the Sierra) than at Granada, which is on the north; a bridle-road leads from its rocky fastnesses and ravines, its terraces crowned with wild broom, Spanish chestnuts, and walnuts, to the ancient and classic Carthagera. Shortly before I left Granada *Arge thetis* was coming out in full force, but did not prove very easy to capture, as it flits restlessly up and down the rocky banks, and is consequently difficult to approach over the loose stones of the steep slopes without startling the insect.

The commonest species of butterflies in May were *Pieris daphidice*, two species of fritillary (genus *Melitæa*), and *Polyommatus alexis*. *Satyrus mœra* and *S. meone* were also noticed, but, as far as capturing was concerned, were only represented each by a single specimen. Two other species of Satyrid, one represented by a single specimen and the other by three, were taken, and three out of the said four on the highest ground in the neighbourhood, namely, around the above-mentioned Moorish

remains at the top of the hill. Of *Gonepteryx rhamni* I saw only one male on the banks of the Darro in the outskirts of Granada, and one female near the Sella del Moro, but failed to capture either. I was credibly informed that two or three *G. cleopatra* could be taken a day, at a place nine miles from Granada by following up the course of the Genil, famed for its numerous gentians, fields of forget-me-nots, and wild peonies. One noticeable particular, in respect of the flora of Andalusia, is the number of our well-known garden flowers that flourish perfectly wild in Southern Spain.

As regards Heterocera, one of the commonest and certainly the largest species was *Saturnia pyri*, of which I had several specimens offered me, some of them by the guards of the Alhambra, and could doubtless have had many more.

Diptera did not seem to be common, one or two kinds of *Eristalis* alone excepted. Genera *Syrphus* and *Tabanus* were noticed, but by no means in abundance.

Among Hemiptera the frequent occurrence of *Lygæus militaris*, familiar to the traveller in Syria and Palestine, may be mentioned.

In the class Orthoptera, *Gryllotalpa vulgaris*; and such grasshoppers as were seen (principally *Decticus*, sp. incert., *Mantis religiosa*), had, of course, as yet their wings mostly undeveloped.

At Tangiers, on Wednesday, June 3rd, I succeeded in catching nine *Satyrus meone* between 8 and 10 a.m.; also specimens of *Silpha* and *Scarabæus sacer*. Locusts, mostly dead, but a few still living remnants of the recent plague, whereby the crops were destroyed, were to be met with in the hedgerows (*Acridium peregrinus*).

At Gibraltar, June 4th, one specimen of *S. meone*.

(To be continued.)

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

BY F. H. PERRY COSTE, F.C.S., F.L.S.

(Continued from p. 139.)

V.—THE CHEMICAL ASPECT (*concluded*).

K.

ADDENDUM, ON EXPERIMENTS WITH THE CYANIDE REACTION.*

Before commencing my remarks on the Biological Aspect, I must redeem the promise to detail my further experiments with *C. edusa* and the cyanide bottle. To refresh the memory of

* It will be understood, as already stated, that this subsection was originally written for a footnote to the December issue of the 'Entomologist.'

my readers, I may remind them that, having expressed myself very sceptically as to this extraordinary transformation (Entom. xxiii. 129), I was advised by Mr. Cockerell to try again with a warm, damp cyanide bottle (Entom. xxiii. 20). To this I replied next month (Entom. xxiii. 234), stating that this hint had been acted upon, but still without effect, and promising details in due course. These details I will now briefly give.

In a very damp cyanide bottle I placed two wings of *C. edusa*, and also, for comparison, two of *G. rhamni*; one wing of each was placed on the cyanide, and one pinned to the cork. The bottle was placed for $2\frac{1}{2}$ hours on the ledge of a gas-stove (burning 15 ft. per hour), and $1\frac{1}{2}$ in. in front of the flame. But directly I read Mr. Cockerell's remark about the warming being necessary, it occurred to me as highly probable that the cyanide had nothing to do with the matter, but that heat alone would be equally efficacious. I therefore made a blank experiment by placing in a similar bottle a wing each of *edusa* and *rhamni* (pinned to the cork), this second bottle being placed side by side with the cyanide bottle, and exposed for the same length of time, and under precisely similar conditions. Now as to the results: in the cyanide bottle, after twenty minutes, the *edusa* wing on the cyanide was chiefly white! and, after forty minutes, entirely so, this being no other than the usual solvent effect of cyanide solutions and most other reagents on this species. As to the wing pinned on the cork, it became somewhat brownish; and, on washing it after the expiration of the $2\frac{1}{2}$ hours, all the pigment was washed away, together with the adhering cyanide which had splashed up,—an exceedingly natural result. *G. rhamni* was affected in pretty much the same way. At present, then, I was as far as ever from getting Mr. Edwards' red. As to the wings in the empty bottle, they were absolutely unaffected; so that clearly mere heat has nothing to do with the matter. But still I did not rest here; there seemed a possible objection that might be made, viz., that the heat of the gas-stove was too great, and a gentle but prolonged warmth was necessary. So I placed fresh wings of *edusa* and *rhamni* in the cyanide bottle, both on the cyanide and pinned to the cork, and kept this bottle in a water-oven, where for eight or nine hours daily it was exposed to a temperature of 100° ($=212^{\circ}$ F.). After eight days of this treatment the wings on the cork were absolutely unaffected, while the *edusa* wing on the cyanide was turned brownish as before. I therefore put the matter aside as hopeless. (I might add that an empty bottle containing similar wings, both pinned to the cork and resting on the bottom, was similarly treated, and, of course, with wholly negative results.)

ADDENDUM, December 5th.—The above was written on Nov. 4th, since when, however, I have—at last—succeeded in entirely clearing up the discrepancy between Mr. Edwards' results and my

own. I will be as brief as possible in stating the nature of my new discovery, and the more so since, beyond recounting the one or two startling facts, little can be said until a thorough investigation shall have been made by means of an extended series of experiments in this new direction.

Briefly, then, the cyanide bottle, referred to above, after its eight days' sojourn in the water-oven, had been placed on one side for several months. At the beginning of November—in fact, just after finishing the MS. of the foregoing pages—I thought it as well, by way of special precaution, to give a final look to the wings before throwing them away. The *edusa* was brittle and browner (dull gingerbread colour), as in the experiments made on the gas-stove (*supra*); but, to my intense astonishment, I found on the *ramni* wing what looked by gaslight like red spots. A subsequent examination by daylight failed to confirm this, but, of course, the matter was far too important to rest here. Accordingly, I started a fresh set of experiments by placing wings of *edusa* and *ramni* in (1) an ordinary (collector's) cyanide bottle, and (2) in a bottle containing *only* a mass of potassic cyanide, on to which I poured some water, so that the cyanide was, in places, in a *sloppy* condition. (I should state that similar *simple*, not shop-made, cyanide bottles were used in the previous experiments.) On examining the cyanide bottles after sixty hours I found that in the wet one the *ramni* wings were *largely reddened*, the red being, perhaps, most like a fresh blood stain,—a most indubitable red certainly. Microscopic examination showed that there was no possible delusion about the matter; each individual scale could be seen bright red, whilst the additionally interesting fact was disclosed that the red shaded off into orange at its border. Here, then, we have actually in progress, before our very eyes, the (progressive) evolution of red from yellow *via* orange. I may add that these metamorphosed wings were removed to a dry glass slide, and have already retained their colour for four weeks.*

The *edusa* wing was less satisfactory; it was chiefly a sort of brownish, but I could not thoroughly decide whether or not there was a purplish tint also. It was accordingly replaced in the cyanide bottle, and after another forty-eight hours there could be no longer doubt as to the *red blotches* on the wing, which, however, was to a great extent transparent. The effect was not by any means so marked and striking as in *ramni*, but I wish it to be definitely understood that a red *was* produced. Seeing, however, that the *ramni* effect was so much better (and remembering also that Mr. Edwards' result was not obtained on *edusa*, but on *eurydice*), it seemed to me likely that better effects might be got with such a tint as that of *hyale*, with which accordingly I experi-

* They are still red, June 24th, 1891.

mented next. I succeeded in obtaining red spots, but not to any great extent.

After this, as will be readily understood, I hasten to retract *in toto* my previous scepticism on this subject, and to recant any or every disparaging remark that I may have uttered on the possibility of converting yellow to red artificially; and at the same time I have the very pleasant duty of expressing my sense of the heavy indebtedness under which I lie to Mr. Cockerell for having drawn my attention to Mr. Edwards' statement, and made the further suggestions concerning wet cyanide. My own experiments having been originally planned entirely with *solutions*, it is highly improbable that I should ever have tried a solid, or rather sloppy solid, reagent but for Mr. Cockerell's tenacity in backing up his authority; and therefore I feel that, but for this, I should in all probability have missed the interesting prospect opened up by these new results. At the same time, I may point out that there is reason for surprise at the solution of cyanide failing to produce a red; for even the wet cyanide exerts a considerable *solvent* effect on the pigment, and in the case of the solution—as my readers already know—such solvent action is rapid and complete: under such circumstances there was obviously no time or room for the reddening.

With regard to the new field thus opened out for work, I can promise my readers that it shall be neither neglected nor undervalued; the whole question must be thoroughly and carefully worked out, and already sets of experiments are in progress, and others planned, to this end. Doubtless, before very long, the 'Entomologist' will hear from me on this subject.

In conclusion, I seem bound to say a word as to the bearings of this discovery on my previous interpretations. It will, of course, be understood that it is impossible to make any definite statement, scarcely even to hazard a provisional explanation, on the strength of two or three experiments. However, at present I can see nothing here inconsistent with my theories on these pigments, but, on the contrary, it looks not unlike a confirmation from another side of my conclusions, while especially one may hope that some more definite light may be thrown on the phenomenon, of which an explanation was offered at the conclusion of Subsection F. The statement, however, that *no progressive* metamorphosis can be effected must, of course, go; but, barring this, I think it will be found that there is nothing in these fresh results incompatible with the views expressed on pp. 370, 371, but rather we have here an *ascending* confirmation of explanations founded originally on *descending* experiments. The very uniqueness of (solid) cyanide as a reagent confirms the view, that in all other cases we have retrogressive results,—results wrought by those same reagents which we *know* to retrogressively affect natural reds.

I may add that *heat* has nothing whatever to do with this cyanide reaction, since the above results were obtained in the cold. With regard to the chemistry of the reaction, my own notion is that probably the red is produced by a combination of the cyanogen radicle with the yellow pigment; but all speculation of this sort is better left for the future. It will, of course, be understood that the views suggested by this reaction are scarcely more than hinted at here; a fuller discussion of the whole subject is reserved for a later date.*

VI.—THE BIOLOGICAL ASPECT.

This concluding section will be, as I have already stated, very brief, since it is intended chiefly to draw attention, by quoting a few examples, to the connection between my artificially prepared varieties and those found naturally occurring; and my acquaintance with the literature of "varieties," as well as with large collections, is far too slight to allow me to go much beyond general suggestions.

First of all, however, it is necessary to refer to one question—of some considerable interest—that is naturally suggested by any account of chemical experiments on insect colours; the question, I mean, as to what influence the chemical nature of the soil or food, and even temperature, may have on the colours of insects in the natural state. There is, of course, a general impression among entomologists that such influences may account for a large percentage of variation, especially when in any one district such variation is in one general direction; for instance, I quoted, in the last section,† Dr. Seitz's statement that in one restricted forest area of Brazil all the species of insects showed a great tendency to blue coloration: Wallace, too, remarks‡ that "in Tropical Africa we find two unrelated groups (in the Nymphalidæ and Papilionidæ respectively) characterised by a prevailing blue-green colour not found in any other continent," these groups being *Romalesoma* and *Euryphene*, and *Papilio zalmaxis* and several of the *P. nireus* group. And again, Wallace§ states that "species of totally distinct groups are coloured alike in one district, while in another district the allied species all undergo the same change of colour. The most probable cause for these simultaneous varieties would seem to be the presence of peculiar

* May, 1891. Since writing the above I have made various further experiments, details of which I, however, reserve for the present. Still, I may say that the reddening effect has been obtained with several other yellow species, all of which belong to the Rhopalocera. I have succeeded in reddening no yellow moth yet, neither have I found a similar reaction to occur with any other nitrogenous compound besides potassium cyanide.

† Entom. p. 138, *supra*.

‡ 'Tropical Nature,' p. 256.

§ I do not remember whether Wallace expressly ascribes this phenomena to any supposed local chemical influences or not.

elements or chemical compounds in the soil, the water, or the atmosphere, or of special organic substances in the vegetation; and a wide field is therefore offered for chemical investigation in connection with this subject."

Now, *à priori*, this is undoubtedly a very taking explanation, and it is one that I adopted with great enthusiasm at the commencement of my experiments, expecting them, indeed, to throw considerable light thereupon;* but I must admit that I have by no means so much faith in the principle now; indeed, I should incline—so far as I can see any data for forming an opinion at all—to ascribe to it exceedingly limited efficacy. Of course, I am very conscious of the fact that there is a vast difference between experimenting by external reagents on the colours of dead insects, and experimenting by means of food, that is, by reagents internally administered to living insects, and leading to we know not what modifications of their metabolic processes; but nevertheless, I think that the results of my experiments do give us sufficient insight into the relations of the various colours to make a cautious argument to the living processes legitimate. Here I may recall the speculations that were referred to in the second section of these articles;† for—as was then pointed out—if it had been found that certain reagents produced one coloric change, and certain others quite another, and so on, *then* we should have had considerable reason to suppose that some change in the constituents of the food, the presence of some unusually large proportion of one organic acid, *e. g.*, or of some unusual body, as, for instance, hydrocyanic acid in the peaches and almonds, might lead to some colour variation; but as it is, the experimental results give no support at all to such views; and the fact that chemically the most opposite compounds produce a similar effect on the colours has made me very sceptical as to the potency of variation in food to cause *any marked* coloric change. I would not be understood to deny such influence *in toto*; for instance, it is stated—and, I suppose, on sufficiently good authority—that dark varieties of *A. caia* may be obtained by feeding the larvæ on walnut leaves, and again, that good varieties may be got by feeding on plants standing in salt water; but I doubt if any *great* coloric change will be obtained by any such direct means. Let us look a little deeper into the question; we have three classes of colours, *viz.*, the physical, the soluble pigmental colours, and the "reversible" pigmental. Now, as to the physical colours, any direct chemical action of the food‡ on these is out of the question, and my scepticism concerning the efficacy of the first to cause coloric variation is strengthened in

* Cf. Entom. 1890, p. 156.

† Cf. Entom. 1890, pp. 156, 157.

‡ I am confining myself to the question of the chemical influences of the food, since it seems clear that any chemical idiosyncracies of the soil or the water would only act *viâ* the food—*viz.*, by affecting that. I will refer to the atmosphere and temperature effects directly.

no small manner by the fact that so many of the instances that are quoted by writers to support that view are really instances of *physical* colour; for instance, the blue-green referred to by Wallace above is probably one of the physical colours,—in the case of *P. niveus* certainly so; and, with regard to the general variation towards blue observed by Dr. Seitz—well, my readers may judge for themselves how heavy are the odds against any blue being a pigment colour. Again, Wallace remarks that the Lepidoptera of the Philippine Islands are characterised by the prevalence of *metallic* markings: here is a clear local idiosyncrasy, but these metallic markings are physical, not pigmental. In the next place, taking the soluble pigment colours, chestnut and yellow, it does not seem eminently probable that any difference of food could lead to a *disappearance* of these colours, that is, to a *white* variety. It therefore seems to me that the region for this hypothetical action of the food is greatly narrowed, being, indeed, reduced to the following peculiarities: that yellow or chestnut may develop the progressive variation red, that red may (retrogressively) stop short at yellow or chestnut, that green may stop short at yellow, or finally—a very bold speculation—that a pigment, which ought to develop as green, may—so to speak—take another road after reaching yellow, and thence develop as red (or *vice versâ*). If, therefore, anybody chooses to believe that within this restricted province coloric variation is caused by abnormalities in the food, there is nothing in my results or the deductions therefrom to directly contradict such view; but at the same time, I am not aware of any evidence at all in its favour. Nevertheless, in thus saying, I would not wish to express at all so complete a scepticism as to the influence of the food in producing *slight* differences, *e. g.*, in depth or shade of colour, and so on; but I certainly demur for the present to ascribing much to this factor.

Now to state my own view—I should rather incline to look upon the whole affair as a matter of indirect influence; instead of ascribing any given coloric variety to the presence or absence of a definite chemical constituent in the food, I should suggest whether the varying totality of conditions of the environment generally, may not act by more or less damaging the normal equilibrium of the insect's constitution: the various metabolic processes we know are in the highest degree plastic, and it would be easily intelligible that any unusual factor in the surrounding conditions should react on the constitution, and so *indirectly* lead to modifications in the pigments, &c., produced. An advantage of this explanation would be that we could include in it *all* varieties in pigmental colouring,* whether produced by food or

* It is as though—if I may use the simile—we should, after looking through a kaleidoscope, give it a good shaking; it is quite certain that this treatment would "affect the constitution" of the kaleidoscope, and lead to a new pattern being produced; but we are quite unable to prophecy any definite or particular path.

even by climatic conditions. To begin with, I should incline to explain all cases of *retrogressive* variations by want of food or generally unhealthy conditions; pigments, it must be remembered, are physiologically waste products, and I could count upon the support at least of such authors as Geddes and Thomson for the view that when nutrition is low the profusion of katobolism is much diminished, and little or no pigment produced. If, then, it should appear that an atmospherically unfavourable season, or the proximity of factories, tended to produce any (retrogressive) varieties, such facts would be easily explicable, just as much as a similar production of varieties by bad or insufficient food. It will, I think, appear upon examination that several arguments converge to support this view, and, first of all, I will point out that most of the varieties chronicled seem to be *retrogressive* ones, the commonest of all, *viz.*, yellow varieties of red species, being clearly such: of the progressive varieties I will speak anon.

Now, one fact that has appeared to me to possibly support this position, is the variation of *Colias edusa* to *helice*. This white variety is, I believe, confined to the female; and if we consider that pigments imply "waste energy," that they are nearly always more abundant and richer in the male than in the female, it does appear to me as not impossible that such varieties as *helice* may betoken a deficiency of katobolic energy, that, in short, they may be a starvation phenomenon; that such phenomena should occur exclusively in the female would be due to the fact that in the female there is always less surplusage of katobolic products, and that, therefore, the pigment is more likely to fail them than the male.*

(To be concluded.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

NOTODONTA TREPIDA AT ELECTRIC LIGHT.—I beg to report the capture of a specimen of *Notodonta trepida*, which I took at electric light on June 6th.—O. FARRANT; Taunton, Somerset.

NOTE ON LARVÆ OF NUDARIA MUNDANA.—When in Gloucestershire, on the Cotswolds, last summer, I found on one occasion a number of small larvæ, pale brown in colour and somewhat hairy, congregated together on an old wooden rustic gate. On looking closely, I found they were feeding on a green lichen on the wood. Taking a few of them, I fed them on the green lichen on pieces of the bark of larch firs; they ultimately turned to small pale pupæ, in a slight web, and emerged as *Nudaria mundana*. I have always found this moth common on the Cotswolds, but have not seen it in this district, neither in parts of South Wales; so apparently it

* I am aware that this may sound very like definitely adopting the views for which Geddes and Thomson were somewhat severely criticised; but, as a matter of fact, I am rather throwing out a suggestion than proposing a definite hypothesis.

is rather local. The above may be of interest to those entomologists who are not acquainted with the larvæ.—T. B. JEFFERTS; Clevedon.

[Larvæ of *N. mundana* are common on the loose stone walls around Lynton, Lynmouth, and Ilfracombe, in N. Devon. Occasionally they are found on the rocks by the sea, but always above high-water mark, in the same localities.—ED.]

NEW SPECIES OF LEPIDOPTERA FROM QUEENSLAND.—In the 'Queenslander,' May 2nd and 9th, 1891, Dr. T. P. Lucas, of Brisbane, describes the following species of Lepidoptera as new to Science:—*Holochila (Polymmatous) translucens*, n. s.; *H. (P.) cæruleolactea*, n. s.; *Macroglossa approximans*, n. s. (allied to *M. errans*, Boisd.); *M. tenebrosa*, n. s. (allied to *M. micacea*, Walk.); *M. lineata*, n. s. (near *M. trochilus*, Hübner; *M. sitieul*, Boisd., and *M. corythus*, Boisd.); *Chærocampa curvilinea*, n. s. (allied to *C. clotho*, Drury); *C. luteotincta*, n. s.; *C. queenslandi*, n. s.; *Panacra turneri*, n. s.; *Sphinx distincta*, n. s. (allied to *S. convolvuli* and *S. rosea*); *S. eramophilæ*, n. s.—ED.

AUSTRALIAN RHOPALOCERA: A CORRECTION IN.—*Lycæna exilis*, Queensland Royal. Col. Trans. 1889, should be *Lycæna exiloides*, Luc.—T. P. LUCAS; Brisbane, Queensland.

EMERGENCE OF IMAGO AFTER INJURY TO LARVA.—Last season I had a number of the larvæ of *Bombyx quercus* feeding in a glass receptacle, and through an accident one was badly cut by broken glass. Although little thinking that the larva would survive, I placed some fine earth upon the wound, and the bleeding was stopped. The larva had contracted considerably, but soon after formed a weak light-coloured cocoon, which subsequently developed (to my surprise) a perfect male specimen, much smaller and paler than the type. I may state that the larva was a large one, and from its size I should have expected a female imago. Until the present instance all larvæ badly injured that have come under my notice have succumbed.—ALFRED T. M. MITCHELL; 5, Clayton Terrace, Gunnersbury, June 15, 1891.

DRYMONIA CHAONIA AND CUCULLIA CHAMOMILLÆ AT CHRISTCHURCH.—It may be of interest to note that I captured, on May 9th, a female specimen of *Drymonia chaonia*, whilst flying at dusk in my garden, from which I obtained some ova; also *Cucullia chamomillæ*, on the evening of the 11th, at laurel blossom close to the same spot. Both are in fine condition, and I believe these species have never been taken in this neighbourhood before.—J. M. ADYE; Somerford Grange, June 3, 1891.

NOTE ON CIDARIA SUFFUMATA.—In May, 1890, Mr. Purdy, of Folkestone, sent me two or three female specimens of *C. suffumata*, which he had captured in the Dover locality celebrated for producing a very beautiful black-banded silvery form of the species. At the same time he forwarded me a few ova deposited by a female of the form referred to. The female specimens were in a moribund condition when they came to hand; however, each had laid a few eggs during their journey to town, but these, together with those from the aberrant female, did not exceed forty in number. It was not thought worth while to keep the small batches separate, so all were placed together in a box, and when the larvæ hatched out they were fed up as one brood. The larvæ were started in life upon a diet

of the common cleavers (*Galium aparine*), but were subsequently supplied at intervals with *G. mollugo* and *G. saxatile*, both of which they ate with gusto. *G. aparine*, however, formed the principal article of their daily bill of fare. Pupation occurred in earthen cocoons formed in June. The bulk of the pupæ were kept indoors, but a portion of them were allowed to remain in the garden throughout the memorable winter of 1890-91. The first specimen, a male, emerged from the indoor pupæ on the 10th of April, and was followed by others each day during the month. The moths from the outdoor pupæ emerged from the 8th to the 12th of May. Examples of the black-banded silvery variety were obtained from each lot, nine specimens in all. I may add that at the present time (June 24th) I have pupæ from the following pairings:—

- | | | | |
|-------------------|------------------|-----------------------|-------------------|
| A. Typical | ♀, bred April 12 | × typical | ♂, bred April 12. |
| B. Banded silvery | ♀, " " | 13 × " | ♂, " " 14. |
| C. Typical | ♀, " " | 17 × crippled typical | ♂, " " 10. |

—RICHARD SOUTH; 12 Abbey Gardens, London, N.W.

HABITS OF LEUCOPHASIA SINAPIS.—On the 31st of May I had the pleasure of seeing *L. sinapis*, the first I have seen this season. I saw only one specimen, and this during the short time I watched it settled on three flowers. I am not familiar with this insect, but had always understood that it is rarely seen to settle. I should be obliged if someone would give me information on this point.—H. S. FREMLIN; 4, Angel Terrace, Tiverton, June 2, 1891.

CAPTURES AT THE ELECTRIC LIGHT.—In a recent number of the American 'Entomological News,' Mr. Rodrigues Ottolengui contributes an interesting account of work done at two electric lights in a secluded part of Brooklyn. Last season he and his sister visited the lights, and with nets and bottles captured a very large number of Lepidoptera during the seventy-five nights they devoted to the pastime. Among the captures were—Sphingidæ, 13 species; Zygænidæ, 3 species; Bombyces, 37 species; Noctuæ, 59 species; and Geometræ, 17 species. Some of the species obtained were considered rare in the district, and others appear to be additions to the insect fauna-list of Brooklyn. Mr. Ottolengui does not state at what height the lights were from the ground; but our lepidopterists living in towns where the electric light is situated in favourable spots, will perhaps do well to give such lights their careful attention.—RICHARD SOUTH.

NOTE ON COREMIA UNIDENTARIA.—On the 1st of August, 1890, I captured a female *C. unidentaria*, which deposited a small batch of ova. The larvæ were kept indoors, fed throughout on knotgrass (*Polygonum aviculare*), and, with the exception of four individuals, all had assumed the pupa state in October. The first imago, a male, made its appearance on the evening of December 31st; two others came up on the 4th of February, and were succeeded by one male and two females on March 1st, and two females on March 7th. Between the last date and the 25th of the month several specimens of each sex emerged. Two females were placed in boxes, and deposited ova—on pieces of thread with which they were supplied for the purpose—between the 18th and 20th of March; larvæ from these hatched out from April 8th to 11th, and were supplied with dock at first, but dandelion was afterwards added, and later on primrose and hawthorn. All these plants were favourably received, and, although when it was first

added to the *menu* a decided preference was shown for the primrose, this did not last long, and on the whole the larvæ seemed to be equally content with *Rumex* or *Taraxacum*, *Primula* or *Cratægus*. The larvæ commenced to go down on May 29th. As has been stated, four caterpillars hybernated; these were supplied with dock and dandelion in March, attained the pupa state at the end of that month, and produced three female imagines between 27th and 29th of April. There is no difference whatever between these specimens and those obtained from the larvæ which pupated in October. On the 23rd of May a female was captured at Oxshott, and deposited about thirty-six eggs between that date and the 28th, when she died; the larvæ hatched out June 4th, and are being fed on hawthorn and bramble.—RICHARD SOUTH; June 20, 1891.

STAUIOPUS FAGI IN OXFORDSHIRE.—I doubt not 1891 will be remembered by Reading collectors as a great *fagi* year; they have appeared in unusual numbers. My own share has been eleven—six males and five females. I started with two males on the 20th May, and finished up with a female on the 4th June; my best take was three females on June 2nd. The males were out fully a week before the females. A tree to tree search must be made to find *fagi*, the smaller trees being the most favoured. Ten moths of the eleven I found on the N. or N.E. side of the trunk; the eleventh was a cripple, which had chosen the S. side. There is every probability of *fagi* occurring in all the big beech woods that abound on the borders of the Thames Valley, finding it being merely a matter of thorough and systematic searching.—J. CLARKE; Reading, June, 1891.

TORTRIX PICEANA, &C., IN THE ESHER DISTRICT.—Larvæ of *Tortrix piceana* appear to be scarce this year in the pine woods around Esher. On Saturday, June 13th last, the united efforts of four keen hunters resulted in a grand total of four larvæ and one pupa. This was rather a poor afternoon's work. However, the time was not altogether spent in vain, as larvæ of sundry other fir-feeding Tortrices were obtained pretty freely; among the insects to be bred from these is probably *Sericoris bifasciana*. In the evening, high-flying Tortrices were fairly common, and several fine specimens of *Pædisca rubiginosana*, *Retinia pinivorana*, and *R. turionella* were captured; whilst a splendid female *Bombyx rubi* fell to the net of a member of the quartette, who also captured one female specimen of *Scodonia belgiaria*.—R. ADKIN; Lewisham, June, 1891.

XANTHIA CITRAGO LARVÆ AT ROTHERHAM.—The larvæ of *X. citrago* have been rather plentiful in our district this year. Spring larvæ have been fairly numerous; and altogether I have, so far, had a good entomological season.—J. N. YOUNG; Rotherham, June 13, 1891.

DECOY FOR BUTTERFLIES.—I understand that some collectors of tropical butterflies find it a good plan to use a decoy to facilitate the capture of the shy species of Nymphalidæ. When a specimen of a desired species is secured, this is killed and placed with its wings expanded, either on the ground or on a twig, within easy striking distance of the operator, who takes up a convenient position, where he must be, as far as possible, concealed, and there await the arrival of other specimens. Perhaps the would-be captor of *Apatura iris* may think it worth while to try a decoy in some haunt of H. I. M. Probably a dry set-out specimen would answer the purpose.—RICHARD SOUTH.

BANANAS, A BAIT FOR LEPIDOPTERA.—Over-ripe or decaying bananas have been successfully used as a bait for night-flying moths, as well as butterflies. The fruit should be cut in slices and pinned on trees, or otherwise exposed, as may be most convenient.—RICHARD SOUTH.

ANDRENA BUCEPHALA AT BOX HILL.—This being an entirely new locality for this species of spring bee, I have very great pleasure in recording so interesting a capture. On the 5th of last month, in the company of Mr. A. Beaumont, I visited the neighbourhood of Box Hill, hoping to capture a few additional insects for my collection. The weather was overcast, with a cold N.E. wind blowing, and anything but propitious for our recreation. We were, however, favoured with an occasional spell of sunshine, which, although very brief, while it lasted induced a host of insects to appear. During one of these intervals of sunshine we came across a magnificent clump of sloe bushes (*Prunus spinosa*), which were completely covered with a dense mass of bloom; hovering over and around these bushes were numerous species of Diptera, Ichneumonidæ, Andrenadæ, &c., and, amongst others, *Andrena bucephala*, Steph., several of which were captured, Mr. Beaumont taking one with an abnormally large head. As I was not familiar with this species, I submitted it to my friend Mr. Edward Saunders, who, with his usual kindness, at once identified it for me, and at the same time informed me that it was an extremely interesting capture. Mr. Smith, in his Cat. Brit. Hym., 2 ed., p. 41, says "the species is now rare," and gives as localities for it Bristol and Chobham Common. Mr. E. Saunders says local, and adds Hampstead as another locality, *Andrena albicans*, *A. trimmerana*, and *A. nigroænea* were very abundant, while *Nomada ruficornis* and *N. alternata*, although not so numerous, were also in the company.—T. R. BILLUPS; 20, Swiss Villas Coplestone Road, Peckham, S.E.

NOMADA LATERALIS, Panz., AT BOX HILL.—Two specimens of this handsome parasitic bee were also taken by me at the same cluster of bushes, and, as Mr. Edward Saunders only gives Norwich, Yorkshire and Newcastle as its known localities, while Mr. Smith adds Highgate Archway, I think it is nearly safe to assume that this is also a new locality for the species. As it was captured in company of *Andrena bucephala*, which is said to be its host, I have much pleasure in being able to record the capture of parasite and host at the same time.—T. R. BILLUPS.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—May 6th, 1891.—Mr. Frederick DuCane Godman, M.A., F.R.S., President, in the chair. Mr. J. M. Ayde, of Somerford Grange, Christchurch, Hants, and the Rev. John Seymour St. John, B.A., of 42, Castlewood Road, Stamford Hill, N., were elected Fellows; and Mr. R. A. Dallas Beeching was admitted into the Society. Mr. E. B. Poulton exhibited living larvæ of *Endromis versicolora*, and commented on their habits. Mr. W. F. H. Blandford called attention to the fact that the larvæ of *Liparis monacha* remained in small groups on the bark of the tree for about a week after emerging from the eggs, and that this fact was taken advantage of by the German foresters to destroy them. Also that he had himself verified the statement that uric acid can be

detected in the malpighian tubes of insects. Mr. M'Lachlan agreed that the demonstration that the malpighian tubes were of the nature of renal organs was now satisfactory. Mr. C. J. Gahan exhibited two species of Coleoptera that he considered to possess a mimetic resemblance, viz., *Estigmenâ chinensis*, one of the Hispidæ, and a nondescript Lamiid allied to *Pemptolasius*. He called attention to a peculiar structure of the antennæ in the latter by which the resemblance was increased. Mr. J. W. Tutt exhibited a hybrid between *Amphidasys prodromaria* and *A. betularia*, obtained by Dr. Chapman. Mr. Stainton commented on the fact that the two insects appeared at different times; and Mr. Tutt stated that the *A. betularia* had been subjected to forcing, so as to cause it to emerge at the same time as *A. prodromaria*. Mr. Tutt also exhibited forms of *Caradrina*, some of which he said were considered distinct on the Continent, though they were not recognised as such in this country, viz., *C. taraxaci* (*blanda*) *C. superstes*, Tr., from Sligo, and *C. superstes*, H.-S., considered as synonymous with *superstes*, Tr., but apparently more closely allied to *C. ambigua*. Mr. B. A. Bristowe exhibited varieties of *Arctia menthastri*, some of which had been fed on mulberry and others on walnut; no difference was observed in the variation. Mr. G. Elisha exhibited larvæ in their cases of *Coleophora vibicigerella* and *C. maritimella*. Mr. A. G. Butler communicated a paper entitled "Additional notes on the synonymy of the genera of Noctuid Moths."—DAVID SHARP, V.P., *Acting Secretary*.

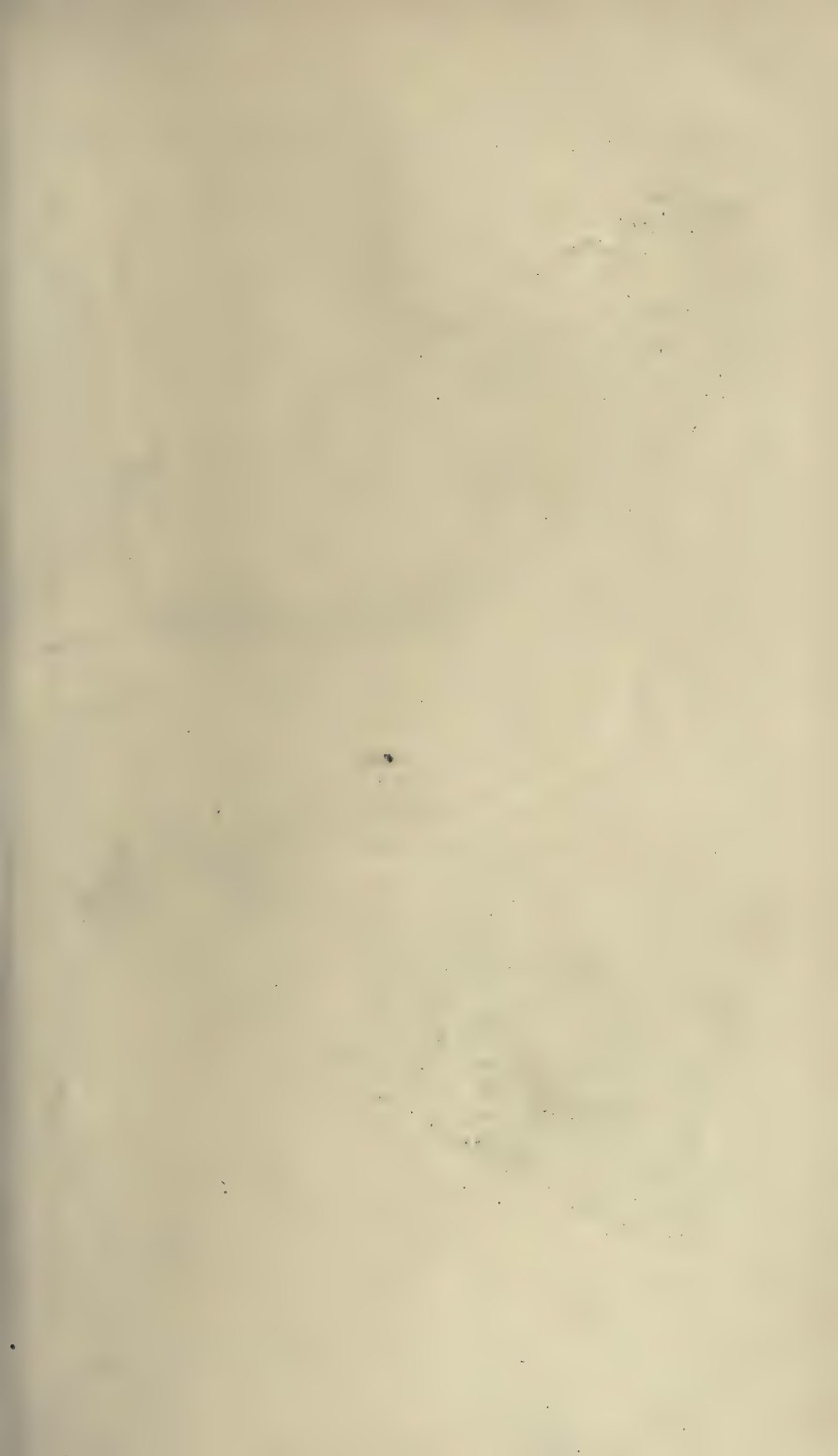
SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—*May 28th*, 1891.—Mr. C. G. Barrett, F.E.S., Vice-President, in the chair. Mr. J. F. Farmer, of Surbiton, was elected a member. Mr. C. Fenn exhibited a series of *Biston hirtaria*, Clerck, and stated that he had taken 70 in three-quarters of an hour in Finsbury Circus. Mr. R. Adkin, *Endromis versicolor*, L., bred from larvæ fed in 1888; and remarked that, in 1889, two females emerged; in 1890, five females and one male. Mr. Dobson, referring to a brood of *Acronycta leporina*, L., said that the first year about 15 per cent. came out, in the second year 60 per cent. Mr. Fenn stated that the late Mr. Tester had told him that *E. versicolor* sometimes remained in pupa over five years. References were also made to other species laying over, among which were *Eriogaster lanestris*, L., *Asteroscopus nubeculosa*, Esp., *Eupithecia venosata*, Fb., *Emmelesia albulata*, Schiff., and *E. unifasciata*. Mr. South exhibited specimens of *Vanessa antiopa*, L., from India, China, Japan, Germany, and France, and remarked that the American form was usually considered to present a more powdery appearance of the border, but some of the specimens shown from France were quite as much powdered. Mr. Cockerell exhibited a variety of *V. antiopa*, having the margins irrorated with black, from Colorado. A discussion ensued with regard to the colour of the margins of this species in different countries, and whether the colour of living insects could fade. Mr. South also exhibited *Cidaria suffumata*, Hb., bred from parents received from Dover, and he made some observations thereon. Mr. Tutt, a hybrid between *Amphidasys betularia*, L., and *A. strataria*, Hufn., belonging to Dr. Chapman, and types for comparison; also *Caradrina ambigua*, Fb., from Deal; also typical specimens of *C. taraxaci*, Hb., and *C. superstes*, Tr., from Sligo; and *C. superstes*, H.-S., from Yarmouth, Isle of Wight. Mr. Adye, a dark form of *Cucullia chamomille*, Schiff. Mr. Hawes, a sketch of *Euchloë cardamines*, L., at rest on a piece of grass, and pointed out that its position was well adapted

for keeping off the rain. Mr. Cockerell, *Clausilia rolphii*, from Plumstead, collected by the Rev. J. W. Horsley.

June 11th, 1891.—Mr. W. H. Tugwell, President, in the chair. Mr. R. Adkin exhibited and made remarks on *Larentia didymata*, Tr., from the Isle of Man. Mr. Tugwell, *Spilosoma mendica*, Esp., bred from ova received from Mr. Porritt; and specimens, sent from Mr. Harrison, as being the normal form in the Barnsley district. Mr. Tugwell pointed out that the males of the species from Barnsley were paler and smaller than the usual southern form, and gradually toned down toward the var. *rustica*. Mr. Tutt, specimens of *Vanessa atalanta*, L. (of which five were bred), with the right superior wing very small, but perfectly developed. Mr. Hall stated that he had a quantity of *Sesia myopiformis*, Bork., feeding in some pear trees in his garden, and wished to know the best means of taking them, and it was suggested sleeving the infected branches; and it was remarked that the species emerged early in the morning. Several observations were made on the backwardness of the season and the absence of Lepidoptera, although Mr. Auld stated that he had found many species abundant in Kent; and Mr. Adye said he had seen *Heliaca tenebrata*, Scop., and several other species, extremely abundant in a meadow near Willesden.

On the 23rd May last, the members of the South London Entomological and Natural History Society had an excursion to Oxshot, Surrey, which was conducted by Mr. R. South. There were nearly twenty members who availed themselves of this opportunity of visiting the locality. The weather was fine, but the wind extremely cold, and this, coupled with the lateness of the season, resulted in the individual captures being somewhat small. On leaving the station several specimens of *Euchelia jacobææ*, L., were taken; and shortly afterwards ova of *Gonopteryx rhamni*, L., were found, *in situ*, on a solitary bush of buckthorn. Larvæ of *Cymatophora flavicornis*, L., were taken by Mr. T. J. Washford, who obtained seven or eight; while several other members obtained them, but in less numbers. On the heath, beside the line, a very pretty form of *Ematurga atomaria*, L., occurred, and a black specimen was taken; Mr. Fruing Warne also obtained a black specimen of this species, and also a pretty variety of *Tephrosia crepuscularia*, Hb., the ground colour being yellow. Among other species occurring sparingly were *Cabera pusaria*, L., *Melanippe sociata*, Bork., *Anticlea badiata*, Hb., *Coremia ferrugata*, Clerck, *C. unidentaria*, larvæ of *Ellopiæ prosapiaria*, L., *Thera variata*, Schiff., and were obtained, but were not plentiful. Mr. Step obtained a good many species of mosses; and took a nest of the willow-warbler, containing seven eggs; and many of the party obtained some good and local plants. Particulars of the future excursions can be obtained of H. W. Barker, 83, Brayards Road, Peckham.—H. W. BARKER, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—June 1st, 1891.—Mr. R. C. Bradley in the chair. Mr. G. W. Wynn showed eggs of *Endromis versicolor*, found on birch twigs at Wyre Forest; two small batches had been found placed round the stem, near to the ends of the twigs. He also showed *Tæniocampa populi* from Marston Green, &c. Mr. A. Johnson showed larvæ of *Hibernia aurantiaria*, bred from specimens taken at Sutton. Mr. R. C. Bradley showed a box of Pyralidæ from his collection.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*





Ornithoptera trojana. Staudinger.

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ORNITHOPTERA TROJANA, STAUDINGER.

PLATE IV.

IN the 'Iris,' vol. ii. p. 4, will be found a very fully detailed description of this lovely butterfly. The specimen from which the accompanying plate has been drawn was recently received by me. It came from Palawan (an island to the north of, and about a hundred miles from, Borneo), and it will be seen that it does not differ in any material degree from those received and so excellently described by Dr. Staudinger. This eminent lepidopterist has, however, so far as I can learn, not yet figured the species, and the accompanying Plate will illustrate it for the first time.

"Of this grand new species, or local form of *brookiana*, Dr. Platen unfortunately sent only five males, which were found to differ very little. They are of the same size as the largest *brookiana*, of which the anterior wing of the largest male out of hundreds of specimens measured 3 in. 3 lin., whereas that of the largest *trojana* measured fully 3 in. 7 lin. The green markings of the *trojana* are not of so striking and brilliant gold-green as those found always on the *brookiana*, but more of a blue-green; by one light they are quite a green-blue, whereas by another more emerald than gold-green. The *trojana* has also on the hind margin seven green patches, although they are shorter, wider apart, and not so pointed on their outer end. These patches (of which the last one is always quite separate from the others) gives, on account of this, quite another impression to the *brookiana*, where they appear to run more parallel with the costa, being nothing like so far apart, whereas these diverge on the *trojana*, and only run parallel with the hind margin. Although the different patches (with the exception of the under one, which is quite as pointed as those on the *brookiana*) are much blunter

towards the outer end ; they come nearer the fringes of the hind margin than on the *brookiana*, almost touching it. In particular the more pointed lower green patches of *brookiana* generally end noticeably farther from the hind margin. On the smaller patches of the *trojana* there is missing, not only the point, but also a piece from the basal end, and they are placed nearer the hind margin. The first three to four upper patches in particular are as far apart as they are wide, the lower ones not quite so much, but all of them are always more separated than on the *brookiana*. The conspicuous blue basal spot on the costa of *brookiana* is not found on *trojana*. On the under side, besides the decided blue stripes underneath the middle and on the basal part of the costa, are three pairs of small blue-green (green-blue) stripes between the medial nervures.

"There is more difference between the posterior than between the anterior wings of the *trojana* and *brookiana*. The former has only one blue-green transverse band behind the middle (middle cell). This band, which is not very wide, is divided by the nervures into five or six more or less irregular crescent-shaped (or zigzag) patches on the inside, but which are still connected on the before-mentioned specimens. The whole inner half on the *trojana* is black, and only the nervures more or less faintly marked deep blue, whereas on the *brookiana* it is, with the exception of the costa and a small part of the base, gold-green. The fold in particular, which is turned over, is quite black on the inside although on one specimen it is touched with deep blue on the edges ; the blue-green transverse band is nearer the hind margin on the *trojana* than the edge of the gold-green base division on the *brookiana*. The under side at the base has exactly similar deep blue basal spots as the *brookiana*, but towards the outer part only five to seven small white-grey spots near the nervures. The collar band (prothorax with back of head), as well as the breast, are of a lighter red than on *brookiana*.

"*Ornithoptera trojana* is no doubt rarer, and differs more from *brookiana* than a great many other *Ornithopteras* that have similarity, and can therefore well be termed a distinct species. The fact also, that amongst at least 1000 *Ornithoptera brookiana* from Borneo, Perak, and Sumatra, there was not one specimen found approaching in appearance, nor in a transitory state, to *trojana*, speaks well for the presumption that it is a totally different species.

"But, in view of the wonderful arrangement of design, only met with in these two species (which in itself alone gives rise to generic separation from the *Ornithoptera*), it is just possible that the *trojana*, owing to circumstances (climatic, geological, &c.) unknown to us, is a form of *brookiana* peculiar to the Island of Palawan" (Staudinger).

The specimen figured is almost in bred condition, and is in the rich collection of Mr. Herbert J. Adams, of Enfield. It has the edge of the fold marked with deep rich blue, as in the specimens referred to by Dr. Staudinger.

WILLIAM WATKINS.

The Hollies, Croydon, July, 1891.

NOTES ON RHOPALOCERA IN CORFU.

BY FRANK B. NORRIS.

WHILST lately visiting Corfu with a friend intent on Botany, I carried my net with me, and, thinking that a list of butterflies taken there during the latter half of May and first half of June might interest some of your readers, I venture to send it to you:—

Papilio podalirius, L. (sinon, Poda.) Common on tops of mountains. *P. machaon*, L. Common on tops of mountains. *P. alexanor*, E. Much less common and apparently earlier.

Pieris brassicæ, L. Fairly common. *P. rapæ*, L. Fairly common. *P. ergane*, Hb. Rare. *P. daphidice*, L. Common in lowlands.

Euchloë belia, F., and var. *ansonis*, Hb. Common. *E. tagis*, Hb. Common on hills. Var. *bellezina*. Common on hills.

Leucophasia sinapis, L. Large, 1·75 in. and above. *Ab. diniensis*, Bdv. Common.

Colias edusa, F. Approaching *C. myrmidone*, E., in colour and markings; abundant. Some specimens of male insect had hind wings shot with rosy violet.

Gonopteryx rhamni, L. *G. cleopatra*, L. Commoner than the above.

Thecla ilicis, E. Abundant on low bushes on hill slopes. *T. rubi*, L. On hills in May.

Polyommatus alciphron, Rott. Rare; May. *P. phleas* var *eleus*, F. Common.

Lycæna argiolus, L. In the Park. *L. minimus*, Fuessly. Mte. San Salvatore; May. *L. melanops*, Bdv. On bushy slopes; May.

Charaxes jasius, L. This splendid butterfly first appeared towards end of May, and became more abundant as June progressed. Always found on higher mountain tops, where the arbutus grows freely, such as on Mte. Mattia, San Georgio, &c. Its exceedingly rapid flight makes its capture difficult without breaking off the tails.

Limnitis camilla, F. On bushy sheltered slopes.

Vanessa egea, Cr. Common. *V. polychloros*, L. Over trees in town of Corfu and Park. *V. urticæ*, L. Rare; of the variety *turcica*, Stgr. *V. io*, L. Not common. *V. antiopa*, L. Not common. *V. atalanta*, L. Common. *V. cardui*, L. Common.

Melitæa didyma, O. Very common. *M. cinxia*, L. Not common; May. *M. phæbe*, Kn. Hill-tops; May.

Melanargia larissa, Hb. Abundant; June.

Satyrus hermione, L. Common on mountains, settling on rocks and trees. *S. semele*, L. Females very large, measuring nearly 3 in.

Pararge roxelana, Cr. Common on hill-sides, settling on olive trunks and rocks with *S. hermione*. *P. mæra*, L. Scarce; May.

P. megæra, L. Scarce; May. *P. egeria*, L. In Park.

Epinephele janira, and var. *hispulla*, Hb. Common. *E. ida*, E. On coast and towards Lefkimo; June.

Spilothyris alcea, E. Not common; May.

Syrichthus orbifer, Hb. Fairly common; May.

Nisoniades marloyi, Bdv. Rare; Mte. Pyliades. May.

Hesperia thaumas, E. Fairly common, but local. *H. actæon*, E. Fairly common, but local. *H. sylvanus*, E. Fairly common, but local.

Also one or two other skippers I have not quite determined.

The above list is, I know, a short one, and whole genera are absent; but no doubt I missed many of the spring insects, and left previous to the emergence of the autumn species. It was noticeable that the summits of the mountains and hills afforded the best sport. I need hardly speak of the extreme beauty of the island, so rich in plants, or of the olive trees, which are said to be the finest in the world, or of the picturesque Greek costumes of the inhabitants. The climate was superb; no rain fell during the month I was there, and, although the sun's heat in June was very fierce, there was always a pleasant sea-breeze.

Bagni di Lucca.

SYNONYMIC NOTES: PYRALIDÆ.

By W. WARREN, M.A., F.E.S., &c.

THROUGH the comparison of types and descriptions rendered necessary in the course of rearranging the Pyralidæ in the British Museum Collection, many synonymic rectifications have occurred; and as the publication of the synonymy *in full* will not be practicable at present, a selection is now given of a few of the most important, and generally interesting, corrections.

HERBULA, Guenée.

Herbula torvalis.

Botys torvalis, Moeschl., W. E. M., 1864, p. 198, pl. 5, fig. 16, ♂; Pack. Labr., xi., 52; S. & W., Cat., No. 191.

Scoparia gelida, M'Lachl., Journ. Linn. Soc., xiv., p. 115.

A comparison of the specimens from Grinnell's Land, in the Brit. Mus. Coll., named by Mr. M'Lachlan *Scoparia gelida*, with examples of *Botys torvalis*, Moeschl., lately received from Dr. Staudinger, establishes the identity of the two species. Moeschler's name has the priority.

EUMELIA, Hübner.

Eumelia venustalis.

Phalæna venustalis, Cram., Pap. Exot., iv., pl. 371, fig. 1.

Eumelia testula, Hüb., Zutr., v., 8, 409, figs. 817, 818.

Botys divulsalis, Zell., Caffr., p. 47.

Eurycreon divulsalis, Led., W. E. M., vii., p. 376.

Scopula jucundalis, Wlk., xxxiv., p. 1469.

South Africa.

Zeller considered his *divulsalis* to be different from *testula* and *venustalis*; but the points of difference appear to be due to sex and variation only.

BLEPHARUCHA, Warr.

Blepharucha zaide.

Phalæna Pyralis zaide, Stoll., pl. 36, fig. 6.

Botys zaide, Led., W. E. M., vii., pp. 368, 461, pl. 8, fig. 8.

Cynæda (?) *zaide*, Wlk., xxxiv., p. 1224.

Dichroma zaida, Wlk., xxiv., p. 1146.

Argyrophora zaidaria, Guen., Phal., ii., p. 232.

Botys cruoralis, Zell., Caffr., p. 51.

Scopula dilaceratalis, Wlk., xxxiv., p. 1469.

South Africa.

Blepharucha plumbatalis.

Botys plumbatalis, Zell., Caffr., p. 47. *B. plumbofascialis*,
Led., W. E. M., vii., pp. 363, 461, pl. 8, fig. 7.

Boreophila plumbofascialis, Wlk., xxxiv., p. 1280.

Scopula ferriscriptalis, Wlk., xxxiv., p. 1467.

South Africa.

BOREOPHILA, Guen.

Boreophila commixtal.

Scopula commixtal, Wlk., xxxiv., p. 1459.

Crambus indotatellus, Wlk., xxxv., p. 1752.

Botys septentrionalis, Tgstr., Cat., p. 358. *B. manualis*, var. *b*,
S. & W., Cat., No. 136.

The types of *commixtal* and *indotatellus*, both from Canada; of *septentrionalis*, from Finland. In his Catalogue, *loc. cit.*, Staudinger, after quoting *septentrionalis*, Tgstr., as a var. of *manualis*, adds the query, "species propria?" The comparison of Walker's type of *commixtal* with specimens in the Zeller Collection, marked *septentrionalis*, Tengstr., shows their identity. This occurrence of the same species in Finland and N. Canada is interesting. Walker's type of *indotatellus*—recognizable, but in deplorable condition—is from the same locality and source as his type of *commixtal*.

Boreophila frustalis.

Botys frustalis, Zell., Caffr., p. 48.

Eurycreon frustalis, Led., W. E. M., vii., p. 376. *E. leucostictalis*, Zell., Verh., Z. B., Ver., 1872, p. 518.

After describing *B. cerealis* (*Eurycreon*) from North America, Zeller, *loc. cit.*, adds the description of another species of the same genus from South Africa, under the name of *leucostictalis*, evidently, as it would seem, forgetting that he had already introduced the species under the name of *frustalis*.

Guenée, when he formed the genus *Boreophila* (Delt. & Pyr., p. 155), drew attention to the fact that it differed from the species of *Hercyna* by the absence of the dense and furry scaling that characterizes that genus. His first species, *manualis*, agrees well with this exception; but the other two, *scandinavialis* and *frigidalis*, do not. He himself, even, admits that these last are more densely scaled than is *manualis*, and form a kind of transition to *Hercyna*. As a matter of fact, his typical *Boreophila*—*manualis*—is congeneric with that group of *Spilodes*, Guen., of which *sticticalis* is the representative, in which the projection of the forehead is far less conspicuous than in *Spilodes* proper; and with the other species, which Lederer lumps together under the head of *Eurycreon*, including, besides *sticticalis*, Linn., the following species:—*cerealis*, Zell., *commixtalis*, Walk., *officinalis*, Hulst., all from North America; and *frustalis*, Zell., from South Africa.

SPILODES, Guen.

Spilodes helvialis, Walk., xviii., p. 772.

Botys thycesalis, Wlk., xix., p. 981. *B. apertalis*, Wlk., xxxiv., p. 1393 (*nec* p. 1451).

Botis citrina, Gr. & R., Tr. Am. Ent. Soc., i. p. 23, pl. 2, fig. 2; Zell., Verh. Z. B. Ver., 1872, p. 507.

Spilodes oblitalis.

Botys oblitalis, Wlk., xxxiv., p. 1392.

Botis marculenta, Gr. & R., Tr. Am. Ent. Soc., i., p. 23, pl. 2, fig. 21 (*nec* Zeller).

Spilodes mancalis.

Botys mancalis, Led., W. E. M., vii., pp. 371, 464, pl. 9, fig. 4.

Botis marculenta, Zell., Verh. Z. B. Ver., 1872, p. 507 (*nec* Gr. & R.).

In the Verh. Z. B. Ver., *loc. cit.*, Zeller states that "he thought he had Gr. & R.'s *marculenta* before him, though his specimens did not tally, in all particulars, with their description." Zeller's own description, however, evidently refers to *B. mancalis*, Led. Subsequently to Zeller's article, Grote seems to have sent Zeller a pair of the real *marculenta*, Gr. & R. These have a

label, in Zeller's own writing, "*B. marculenta*, Grote, N. Y., 73." The inverted commas to the name imply that this was Grote's naming, but that he, Zeller, did not quite endorse it; and this was natural; for these he had, the year before, called *marculenta* were different. Grote himself, however, it would appear, must have got into a muddle about the two species; perhaps owing to Zeller's mistake. Anyhow, in his own collection, the two species were mixed up. Three of the real *marculenta*, of Gr. & R., like the pair Grote had previously sent to Zeller, appear without any name; while of nine specimens of Zeller's wrongly-named *marculenta*, two are actually ticketed, by Grote himself, as "*marculenta*, Gr. & R." In any case, the name *marculenta* will lapse; Gr. & R.'s being superseded by *obliteralis*, Wlk., and Zeller's by *manalis*, Led.

OPSIBOTYS, Warr.

Opsibotys incoloralis.

Botys incoloralis, Guen., Delt. & Pyr., p. 333; Led., W. E. M., vii., p. 371; Snell., Tijds. v. Ent., 1883, p. 126; Meyr., Tr. E. S., 1884, p. 322. *B. melonalis*, Wlk., xviii., p. 702.

Spilodes nitetisalis, Wlk., xviii., p. 773.

Botys albidalis, Wlk., xxxiv., p. 1411. *B. ruficostalis*, Led., Verh. Z. B. Ver., 1855, p. 217, pl. 3, fig. 4. *B. ædipodalis* (?), Swinh., Pr. Z. S., 1884, p. 325 (*nec* Guen.).

The types of *incoloralis*, Guen., *albidalis*, Wlk., and *ædipodalis*, Swinh., from Hindostan; of Lederer's *ruficostalis*, from Syria; of the other two, *nitetisalis* came from the Congo, and *melonalis* from Java; Snellen records it from Celebes, and Meyrick from Australia;—so that the range of the species is extensive; but Walker's *dasconalis*, from North America, is not, as Mr. Meyrick thinks, identical.

Opsibotys coclesalis.

Botys coclesalis, Wlk., xviii., p. 701. *B. itemalisalis*, Wlk., xix., p. 996. *B. strenualis*, Wlk., xxxiv., p. 1409. *B. interfusalis*, Wlk., xxxiv., p. 1443.

The types came from Borneo, China, India, and Java, respectively.

Opsibotys terrealis.

Botys terrealis, Tr., Schm. Eur., vii., p. 110; S. & W., Cat., No. 174. *B. mysippusalis*, Wlk., xviii., p. 564. *B. humilis*, Led., W. E. M., pp. 371, 464, pl. 9, fig. 2.

The last two, both from North America.

Opsibotys extricalis.

Botys extricalis, Guen., Delt. & Pyr., p. 338; Wlk. xviii., p. 562.

Pionea dionalis, Wlk., xviii., p. 758.

Spilodes (?) *niscæcalis*, Wlk., xviii., p. 771.

Botys intricatalis, Led., W. E. M., vii., pp. 373, 469, pl. 10, fig. 9.

Botis oppilalis, Gr., Can. Ent., xii., p. 36.

The identification of Lederer's species with Guenée's is due to Prof. Fernald.

ISOCENTRIS, Meyrick.

Isocentris filalis.

Asopia filalis, Guen., Delt. & Pyr., p. 204.

Lygropia filalis, Led., W. E. M., vii., p. 381.

Botys filalis, Snell., Tijd. v. Ent., 1883, p. 131, pl. 7, fig. 11.

Endotricha rhodophilalis, Wlk., xxxiv., p. 1311.

Samea rhodophilalis, Moore, Ceyl., iii., p. 275, pl. 178, fig. 13, ♀.

Isocentris rhodophilalis, Meyr., Tr. E. S., 1887, p. 232.

Botys amœnalis, Wlk., xxxiv., p. 1445.

Samea dives, Butler, Pr. Z. S., 1880, p. 682.

Botys auralis, Snell., Tijd. v. Ent., 1872, p. 90, pl. 7, figs. 9, 10.

Another wide-ranging species. Guenée's type of *filalis* was from Mauritius; Snellen records it from Celebes, and also from Java, whence, too, Walker's *amœnalis*; Butler's *dives* is from Formosa; it occurs in India and Ceylon; and Meyrick gives it from Australia.

Isocentris xanthialis.

Botys xanthialis, Guen., D. & P., p. 343. *B. superbalis*, Wlk., xxxiv., p. 1397. *B. nicalis*, Snell., Tijd. v. Ent., xviii., p. 202, pl. 11, fig. 13.

All from Tropical America.

CONDYLORRHIZA, Lederer.

Condylorrhiza vestigialis.

Botyodes vestigialis, Guen., Delt. & Pyr., p. 321, ♂.

Botys illutalis, Guen., Delt. & Pyr., p. 333, ♀. ?

Condylorrhiza illutalis, Led., W. E. M., vii., p. 393, pl. 13, fig. 7, ♂.

Botys tritealis, Wlk., xviii., p. 597, ♀. *B. mestoralis*, Wlk., xviii., p. 729, ♀.

The type of Guenée's *illutalis*, a female, was from Brazil; of his *vestigialis*, a male, from Columbia. Walker's type of *tritealis*, from the west coast of South America; the locality of his *mestoralis* was unknown. That Guenée's *Botyodes vestigialis* is the same insect as his, subsequently described, *Botys illutalis*, will be evident on a careful comparison of his two descriptions with that of Lederer. Guenée gives the labial palpi of *vestigialis*

as porrect; the wings, as semitransparent; the hind wing, with a fine subterminal line, quite close to the margin and parallel to it; the second stigma (the reniform) traversed by a pale *nercure* (in *illutalis* he says it is traversed by a "trait clair"); the abdomen of male, which sex, alone, he then described, is said to have the anal tuft black, mixed with yellow hairs, and so, Lederer, describing *illutalis*, a male, draws attention to this black anal tuft.

EPICORSIA, Hübner.

Epicorsia mellinalis.

Epicorsia mellinalis, Hüb., Zut., i., 24, 69, figs. 137, 138; Hüb., Verz., p. 356.

Lonchodes mellinalis, Guen., Delt. & Pyr., p. 355.

Botys mellinalis, Led., W. E. M., vii., p. 371. *B. ædipodalis*, Guen., Delt. & Pyr., p. 336; Led., W. E. M., vii., p. 371.

B. butyrosa, Butler, Pr. Z. S., 1878, p. 493.

Hübner's type of *E. mellinalis* was from Brazil; a comparison of his figure with the description of *ædipodalis* will at once suggest their identity. Guenée, judging from Hübner's figure only, referred the species to his genus *Lonchodes*, of which the labial palpi are upright and applied to the forehead; and, therefore, when he described *ædipodalis*, would naturally not think of identifying it, with its porrect labial palpi, with *mellinalis*, which he had supposed to be a *Lonchodes*. Lederer evidently thought the two species closely related, as he places *ædipodalis*—with which, under that name, he was unacquainted—immediately after *mellinalis*, which he had identified.

EBULEA, Guen.

Ebulea fumalis.

Ebulea fumalis, Guen., Delt. & Pyr., p. 358.

Scopula orasusalis, Wlk., xix., p. 784.

Botis badipennis, Grote, Bull. Buff. Soc. N. H., i., p. 88, pl. 2, fig. 12.

All the types from North America.

CROCIDOLOMIA, Zell.

Crocidolomia binotalis.

Crocidolomia binotalis, Zell., Caffr., p. 66.

Pionea comalis, Guen., Delt. & Pyr., p. 368, ♂. *P. incomalis*, Guen., Delt. & Pyr., p. 369, ♀.

As Zeller's *binotalis* was described from Caffraria, its identity with the Indian insect, the two sexes of which were referred by Guenée to distinct species, was not suspected. Now that the species is known to range from Africa to Australia, this identity admits of no dispute.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

BY F. H. PERRY COSTE, F.C.S., F.L.S.

(Continued from p. 170.)

VI.—THE BIOLOGICAL ASPECT (*continued*).

In the next place, it has appeared to me very strongly suggestive that so many varieties are obtained by *breeding*: with certain red species, I believe, that by breeding on the large scale a percentage of yellow varieties may be certainly expected:* now, it is certain that in breeding insects the natural conditions of life are never attained, and it is therefore not at all strange that a certain derangement of the constitution should occur, leading to imperfect colour development, *i. e.*, to retrogressive varieties.† Very strongly confirmatory, I think, of this view is a fact that I found recorded in the 'Entomologist' (xxiii. p. 184), by Mr. Johnson, who states that a large brood of *A. caia*, reared by him, produced a large percentage of yellowish, &c., varieties, and *also very many cripples*.‡

It must be noted further that, by this principle of *indirect* action, through affecting the constitution, &c., we may equally explain such varieties as the albino specimens of *L. phleas* and the various heath butterflies: it would be exceedingly interesting and instructive if someone who has the opportunity would breed such species on a large scale, keeping them short of food, or otherwise exposing them to somewhat unhealthy conditions; in such case one ought to find—if the above view be correct—a large number of albino varieties. And lastly, I may note a circumstance cited by Wallace—that there is an abnormally large percentage of *pale* or *white* varieties on islands, especially on small ones. It must seem certainly well-nigh impossible to correlate this with any chemical peculiarities of the soil,§ but it is easy to understand that the general conditions may so affect the constitution as to arrest the development of pigment.|| Taking all these facts into consideration, therefore, it does appear to me that there are at least very strong grounds for hesitating to invoke any so direct a factor as the chemical peculiarities of soil or food in order to account for coloric variations; and that there is at least some reason to ascribe the variations to general

* Cf., however, a statement in Entom. xxii. p. 259.

† Of course, it is necessary to the validity of this argument that a larger percentage of such varieties should occur among bred specimens than among those in the natural state. It would be interesting to know whether or not such is the case.

‡ Cf. also Mr. Mitchell's note in Entom. p. 171. Mr. Johnson does not state whether any of the yellowish varieties were also cripples or not.

§ If it be assumed that the presence of salt in the food has anything to do with this, we ought to find similar varieties on all shore lines.

|| If, indeed, the whole question be not one of selection for some end, of which we are at present ignorant.

indirect influences of the surrounding conditions, which may unfavourably affect the constitution and metabolic processes of the insects. It must be remembered that—as I pointed out some time since—all such products as pigments are almost certainly produced by the decomposition of the protoplasm; the various food constituents are first built up into protoplasm, and then this decomposes, with the result of producing *inter alia* pigments.* We cannot safely assume any direct synthesis of such pigments direct from the food, and it does therefore appear to me a somewhat crude, and, so to say, almost too simply *mechanical* a suggestion, that the presence of some unusual chemical constituent† in the food may directly cause a different pigment to be produced. However, there is certainly a wide field for experiment in this direction open to any one who can obtain abundant material for breeding.

With regard to the local prevalence of any one colour, including physical colours such as the blue-green referred to by Wallace, I should rather ascribe them to a general process of selection (for protective purposes probably), which rendered such colours most advantageous: by the well-understood process of the survival of any in the least favourable variations, the whole insect fauna might in time become modified in any coloric direction. There is no need at all to assume in such cases any chemical action of soil or climate.

We will now pass to consider the relation of the various varieties naturally occurring to my experimental varieties, my object being briefly to emphasise the point that the varieties which we know to occur may equally well be produced by means of chemical reagents, whether they be varieties in soluble pigments or in “reversible” pigments; and that, therefore, the existence of such varieties is a strong confirmation of the theories (as to the natural relations of the various colours) that I have deduced from my experiments. There is one qualification necessary, however, *viz.*, that I can produce only retrogressive varieties and not progressive, except in the case of the cyanide reactions of certain yellow species. It will, however, probably be found, I believe, that most of the varieties found naturally occurring *are* retrogressive varieties, and that progressive varieties are far scarcer; at least, that is my impression after collecting records of varieties from several years’ ‘Entomologists,’ and other sources. In other words, then, most varieties will be found to be phenomena of *atavism*, or degeneracy to a former less developed state.‡

First of all, though, it may be as well to say a word as to variation among *physical* colours. There are three conceivable

* See the whole question fully discussed in Vines’ ‘Physiology of Plants.’

† The presence of which, by the way, is wholly hypothetical after all.

‡ It would be deeply interesting to know whether or not specimens showing coloric variation also display any variation in structure. Will any possessor of, *e. g.*, yellow varieties carefully examine the limbs, &c., of his specimens.

directions in which such variations might occur; either one physical colour might replace another, or it might replace a pigment colour, or it might be replaced by a pigment colour. As I have already pointed out,* whenever a replacement of pigmental colours by physical colours occurs, we can only say that the pigment-containing scales have been replaced by unpigmental scales, whose structure is such as to produce the given physical colour. Whether the pigmental scales are merely overlaid by the others, or whether there is an actual absence of pigment, is a highly interesting question, but one into which I am—for want of data—unable to enter here. As examples of such replacement of pigment colour by physical colour, I may refer to the cases of *true* melanism (as distinguished from melanochroism): in the Doubleday collection are specimens of *V. urticae* with the hind wings dull black, of *C. dominula* and *A. villica* with all the wings *entirely black*, of *T. orbona* with hind wings almost entirely dull black. In recent volumes of the 'Entomologist' have been chronicled a black variety of *L. sibylla* (Entom. xxii. 256), of *A. aglaia* (Entom. xxiii. 350), and so on. To these also I may, perhaps, add the variety of an *Argynnis* noted as having a brilliant *gold* spot on the upper surface (Entom. xxii. 233). In all such cases as this it seems perfectly clear that the unpigmental scales—normally present on part of the wings—have invaded and covered the whole surface; but whether such a variation would occur in a species normally destitute of *any*, e. g., black scales, is another question that I am unable to answer. Has anyone, for instance, ever found a truly melanic variety of such a species as *G. rhamni*? We can only wait for information to settle this crucial point.

It may be noted here that in another sense also a pigment colour may be replaced by a physical, *viz.*, when the pigment is not developed in the normally pigmented scales, and the wing is consequently—usually, at least—white; this, however, is a phenomenon of quite another character from the foregoing, and will be appropriately considered later.

In the second place, we might have physical colours replaced by pigmental; this might happen either by the pigmental scales normally present on a wing invading the territory of the *e. g.* black scales; almost the only example that I have seen noted of this was a specimen of *V. maculata*, with only three black spots altogether on the wings (Doubleday collection): or the pigment might be developed *in* normally unpigmented scales. Such varieties as this latter are of very great interest, since—unless I am mistaken—it is in this manner that *all* pigmental colours have originated. Examples of this variation that I have noted are the following: a specimen of *A. grossulariata* (in the Double-

* Entom. xxiii. 313.

day collection) having the ground colour *entirely* yellowish instead of white; in this species the pigment is usually present only as a narrow yellow band: varieties of *E. cardamines* with more than the normal extent of orange (Entom. xxiii. 228): a variety of *A. caia* having white replaced by pink. It must be especially observed that these latter variations are all of them *progressive* in character—advance guards, so to say, of the march towards higher coloric development, and of what we may expect the normal specific type to become in the course of time, if the struggle for existence be sufficiently keen to make such variation advantageous.

The third type of variation in physical colour is when one physical colour is replaced by another—that is to say, when the microscopic structure varies from the normal. If the blue of *Lycænidæ* be physical, then we have examples of this type of variation in the slate-coloured or French grey varieties of *P. alexis*, that have from time to time been chronicled in the 'Entomologist' by Mr. Sabine and others. I would draw especial notice to the fact that exactly similar* artificial varieties have been obtained in my experiments, from which we may conclude that in both cases the effect is due to injury of the fine structure of the scales.† If we consider that the females of the *Lycænæ* preserve the original coloric type, from which the males have advanced to their blue adornment, then we must consider such slate-grey varieties as retrogressive. If, after all, the blue of *Lycænidæ* should prove to be pigmental, then these varieties would acquire far greater interest, and would be ranked as retrogressive varieties of pigment colours, just as those varieties which must now be considered.

As to other varieties of physical colours, I am unfortunately entirely in the dark; one would expect to find varieties of *Thecla rubi* without the green, in fact, of all the physically green species with this green replaced by bronze-brown, &c. Whether or not such varieties have been found I do not know, but I shall be very glad indeed of any information on the subject.

The naturally occurring varieties of pigmental colours are of peculiar interest to me, since—as I think—they form an independent and corroborative chain of evidence in support of the inferences drawn from my experiments; in fact, we have observation and experiment mutually confirmatory. I need scarcely remind my readers of the broad conclusions as to coloric development summarised last month, *viz.*, that red is evolved from yellow, or occasionally from chestnut; that green is probably evolved from yellow; and that yellow and chestnut are closely related and both developed not *from* any white pigment, but *in* a formerly unpigmented and usually white wing. Now, if these inferences

* I have not seen these varieties, but judge merely from the descriptions.

† Cf. statements in Entom. xxiv. p. 116.

be correct, we may anticipate the following occasional variations to a former state,—retrogressive varieties, that is, or cases of arrested development: we should find yellow varieties of red and pink species; chestnut varieties of a few red species, such as *atalanta*, *acontia*, &c.; and yellow varieties of green species; also colourless or very light varieties of yellow and chestnut species, when the pigment, that is, fails to be developed at all; or in a few cases of such non-development of pigment the variety should be black, *e.g.*, in *V. io* and *antiopa*, where the chestnut pigment has been developed on a formerly black wing. It is more questionable whether we should be likely to obtain varieties showing such extreme reversion as white for red: after what has been said in a previous section* on the evolution of red, it is clear that such variation would imply reversion to a very ancient state; still, I should not be surprised at a colourless variety, *e.g.*, *Delias*, where either the evolution of red has been very rapid, or where anyhow the pigment is by no means so stable as in most red species.† A white variety of green species would less surprise me.

And secondly, we might get *progressive* varieties, that is, a normally colourless species might be found pale yellow or chestnut, a yellow or chestnut species might be found red, or a yellow might be green; so, too, an unusually *deep* variety of the normal colour might appear. All such variation would be in entire concord with the theories laid down in these articles as to the evolution of colour; and moreover the abnormal colouring would usually (in all probability) be found as the normal type of an allied species or genus. It is, however, clearly unlikely in a very high degree that we should find a red or green variety of a white species; the leap would be too great. There is yet another possibility; if red and green are both descended from yellow, it is, perhaps, conceivable that a pigment normally green should, under abnormal circumstances, be developed as red—or *vice versâ*—by a diversion from the normal metabolic process after reaching the yellow stage. If, however, any *blue* variety of a pigment colour should occur—or *vice versâ*—that would be a phenomenon of an entirely different nature, and one which cannot be considered under this category. I will now briefly refer to a few instances that illustrate the foregoing remarks:—

A. Colourless varieties of chestnut species. There have been noticed in the 'Entomologist' white varieties of *C. janira* (Entom. xxii. 279),‡ milk-white or "silver" varieties of *L. phlœas* (Entom. xxii. 257 and 279), albino varieties of *C. tithonus* (Entom. xxii. 287), and a white variety of *C. pamphila* (Double-day collection). It is superfluous to point out the exact similarity

* Entom. xxiv. pp. 11—13.

† See Entom. xxiv. 13.

‡ These, I presume, are the same as the so-called "sun-bleached" varieties.

of these phenomena to those that I have produced by means of chemical reagents; and since, in the latter case, I have shown that the pigment is dissolved out, leaving a pure white wing, it seems a fully justifiable conclusion that these natural albino or "sun-bleached" varieties are likewise due to the absence—*i. e.*, to the non-development—of pigment. In a word, I should regard them, as I have already stated, as unhealthy or pathological cases. (As showing the relationship of yellow and chestnut, I may refer to the yellowish varieties of *A. prunaria* in the Doubleday collection.)

B. White (colourless) varieties of yellow species. Theoretically these should be as common as the corresponding varieties of chestnut, but I have not been able to find any record of such varieties. In the Doubleday collection is a specimen of *A. plantaginis* with the hind wings white instead of yellow, a specimen of *R. crategata* "half washed out," of *S. atomaria* partly whitish, and in the 'Entomologist' (xxiii. 382) is chronicled a variety of *V. io* having yellow replaced by white.

C. Yellow or white varieties of green species. I am acquainted with no instances of such, although they doubtless exist, unless we reckon the fading of some green *Geometræ* to white as a case in point.

D. Chestnut varieties of red species. These must necessarily be scarce, since so few red species are descended from chestnut. I have no examples to hand, but the want is partly compensated by the colours of subspecies or allied species. In *Vanessa indica*, a subspecies of *atalanta*, the scarlet is replaced by orange or chestnut; and in *Anartia amalthea* the same bands are scarlet in one specimen, and chestnut in another;* while my reagents convert the former into a chestnut identical with that normally occurring.

E. Yellow varieties of red species. This seems to be by far the most common form of all coloric variation, a fact at which we need feel no surprise, seeing how closely related are red and yellow, and how very little constitutional disturbance is probably requisite in order to upset the normal processes, and arrest the pigmental development at the yellow stage; in such cases also it is clear that I must regard the variation as a pathological symptom. It is almost superfluous to quote examples of this type of variation, but the following are of interest:—Yellow varieties of *Z. filipendulæ* (Doubleday collection), *A. caia* with red replaced by orange† (Doubleday); also bred varieties of *caia* varying from buff to brick-red‡ (Entom. xxiii. 134), orange

* I do not know whether or not this is a sexual difference. Entom. xxiv. p. 91.

† In this specimen also the hind wings were more than normally, and the fore wings nearly wholly, black. This may be considered an instance of general physiological disturbance.

‡ Vide *supra*, p. 186.

varieties of *caia* (Entom. xxiii. 239, 259), *Sesia* with yellow bands instead of red (Entom. xxii. 192). It is again evident that such varieties are identical with those that may be obtained by the action of acids on the normal red species.

F. Interchange of red and green.* This is an exceedingly interesting, but very difficult variation. We may obtain some collateral evidence by comparing the normal colouring of the two sexes; for instance, Wallace states that in many S. American Papilios the green spots on the male are represented by red on the female.† There is a variety of *M. margaritaria* chronicled in which the cilia are red; this may be a case in point, and some further information may perhaps be gained from the consideration of an extraordinary variety of *A. galathea*, to which I must presently refer. This is emphatically a subject in which far more information is wanted.

Then as to *progressive* pigmental variation, I have already given a few instances of yellow and orange varieties of normally white species. I greatly regret, however, to have found no records of any red varieties of yellow species; such varieties would be highly interesting—of great theoretical importance—especially if they occurred in species belonging to a genus that already comprised red forms.

Now for the extraordinary variation of *Arge galathea*, already referred to. It is stated (I presume on good authority) that a specimen is known marked with *green and red*. For a long time this seemed utterly unintelligible and inexplicable to me, but I now think it an interesting confirmation of my views. Clearly—after what has been stated in preceding sections—it would be nothing remarkable to find a yellow variety of *A. galathea*; now, in the red and green variety, it would seem that, owing to some altogether exceptional metabolic conditions, not only has a yellow pigment been developed, but that this has advanced at one bound to its consummation in red, and also simultaneously to its other and divergent goal—green. It is therefore a highly interesting phenomenon, and one in which more information is certainly desirable.

[We must defer the conclusion until September.—Ed.]

* Wallace remarks, in 'Tropical Nature' (p. 134), that the change from green to red—from the more refrangible to the less refrangible is in accordance with the law of change which has been shown to accompany expansion (i. e., by heat) is Inorganic—growth and development in organic—forms. The reference here is to a series of experiments by Mr. Ackroyd, detailed in the 'Chemical News' for August, 1876, where it is shown that the effect of heat on a large number of chemical compounds is to change the colours from a more to a less refrangible colour. With all respect to Dr. Wallace, I must say that the comparison which he attempts to institute between these phenomena of metachromatism and the development of organic colours is, to say the least of it, forced. Moreover, as a matter of fact, I have now shown that there is at least some reason to believe that green was developed from yellow, in which case we have yellow developing, on the one hand, into the more refrangible green, on the other, into the less refrangible red.

† 'Tropical Nature,' 178.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

DEVELOPMENT OF RED PIGMENT IN LEPIDOPTERA.—Mr. Bowles (*ante*, p. 131), after describing a variety of *Papilio phorcas*, remarks:—"I believe it is a generally accepted theory with evolutionists that yellow was evolved in flowers before red. Perhaps this rule might be applicable also to the animal kingdom, and then may not *P. machaon* be on the road to assume," &c. May I be allowed to point out to Mr. Bowles that the supposition which he so cautiously hazards here is simply what I have been insisting on for the last seventeen months in my articles in the 'Entomologist.'—F. H. PERRY COSTE; Ravenshoe, Burnt Ash, Lee, S.E.

EMERGENCE OF IMAGO AFTER INJURY TO LARVA.—I am able to corroborate the incident related by Mr. Alfred T. M. Mitchell (*Entom.* 171). In the autumn of 1889, whilst beating bog-myrtle for larvæ, in Delamere Forest, a caterpillar of *Amphidasys betularia* fell into the umbrella, evidently badly hurt, as it had a wound, which bled freely, near the anal segment. The wound, however, healed up, the larva was full-fed in a day or two, and disappeared below the soil. That, I took for granted, would be the last I should see of it; but, in the following summer, it re-appeared in the form of a fine well-developed black female, var. *doubledayaria*. There could be no mistake, as it was the only *betularia* larva I had that year.—J. ARKLE; Chester, July 18, 1891.

RED-TAILED BUMBLE BEES EATEN BY SHRIKES.—While in the Minera district last year, I was particularly interested to find red-backed shrikes (*Lanius collurio*, L.) feeding their young with *Bombus lapponicus*, Fabr., and *B. lapidarius*, L., principally the former, and this to a very great extent, as their castings consisted almost entirely of the remains of these insects. I also found *B. muscorum*, L., and *B. lapidarius* impaled on the wild rose by shrikes; these were exhibited at the last meeting of the Lancashire and Cheshire Entomological Society, when a member declared that the bees impale themselves by accident, flying against the spines! Curiously enough, my specimens are impaled through the thorax from beneath! How did the bees manage it? I have never witnessed the impaling process, but it is an acknowledged fact that the "butchers" are guilty of such proceedings, and, moreover, it forms part of their generic character. These birds are well known to feed upon bees, wasps, &c., but it seems strange that they should select the red-tailed species in preference to the more sombre-coloured ones.—R. NEWSTEAD; Grosvenor Museum, Chester, July 14, 1891.

SPHODRUS LEUCOPHTHALMUS, L., EMITTING STRONG ACID-LIKE FUMES.—A few days since I received three specimens of this singular beetle from Mr. Kendrick, of Warrington, who has kindly presented them to this museum. While examining one of them with a lens, I noticed that it gave off a most peculiar odour, which, by placing the insect close to the nostrils, caused quite a stifling sensation. This it continued to do for about five minutes, the fumes gradually becoming less strong, until eventually they were not perceptible. I noticed that while this was taking place the dorsal and ventral plates of the abdominal segment were constantly brought together, and between them there was a very small quantity of a clear fluid, but I did not see this produced into a spray, although I held the insect against a good light, and examined it with a lens. The fumes produced by

the insect were almost exactly like those given off by hydrochloric acid. To what practical use this insect can apply this protective agent is somewhat a mystery, as it can have but few, if any, enemies in our cellars, or such places as it is known to frequent. The same may be said of *Blaps mucronata*, which in like manner is said to produce an odour singularly unpleasant. This latter insect occurs pretty freely with us, but, although I have handled many specimens, I have never yet perceived any odour. I may here add that *Carabus granulatus* has the power of emitting a very strong fluid. I was holding one in my hand the other day when it ejected some in my face, producing a most intense burning pain; this was quickly removed by the application of cold water. These facts, although new to me, may be old to many, but some may not have heard of them, and be interested.—R. NEWSTEAD; Grosvenor Museum, Chester.

PLUSIA MONETA IN BRITAIN, 1891.—I had the good fortune to capture, at light, on the evening of July 11th, the sixth British specimen of *Plusia moneta*, Fab. It is a fine specimen in perfect condition, rather larger than that figured in the 'Entomologist' for last September (xxiii. pl. iii. fig. 6). Its occurrence so far inland as the Guildford district in 1891 points to its having established itself as a British species. It is an interesting addition to our fauna, not only on account of its beauty, but because these records imply the extension of the range of the species into the north-western portion of the palæarctic region. I quote Staudinger's 'Catalogue' on the subject of the distribution of another eastern species—*Plusia consona*, F.—for comparison with that of *P. moneta*:—"P. consona, Fabr. Sax.; Austr. Hung.; Bulg.; Ross. m. or.; ? Parisii (1)." In the Parisian example quoted we see the same tendency to migration in a westerly direction. "*Plusia illustris*, Fabr. Germ. m. (c. occ.); Helv.; Gal. m. or.; Ped.; Hung.; Coreyra; Ural." Here we have another eastern species extending into Western Germany. Staudinger does not give "Angl.," but Stainton's 'Manual' states that it has occurred on Salisbury Plain. The distribution of *Plusia modesta*, Hb., is much the same as that of *P. bractea*, Fabr., but *P. modesta* has never been recorded in Britain, though it occurs as far west as Paris. May we not hope, considering the migratory character of the genus, that *P. consona* and *modesta* may some day be added to, and *P. illustris* re-instated in, the list of British Lepidoptera? I shall have the specimen by me to show to anyone who may wish to see it for the next six weeks; after that it will be in the collection of Mr. Bernard Crocker, of Plymouth.—HENRY C. LANG; Rose Hill, Albury, Guildford.

LARVÆ OF EUBOLIA LIMITATA (MENSURARIA) AND PLUSIA PULCHRINA.—Book after book one takes up, and the larvæ of these common moths are dismissed as rather undiscovered things. Here is an opportunity for some young entomologist! Beat nettles into a newspaper at the end of May and the beginning of June. It is worth while. You will come across larvæ of good moths, particularly of the *Plusia* family; and a bred moth, even if it be common, is often worth any number of netted ones. There will also fall to your share a pea-green, very un-Geometer-like, caterpillar, with a humped sort of back, and a whitish yellowish line along each side. It looks far more like a *Noctua*, but it is the larva of *E. limitata*. It spins a whitish silken cocoon among the nettle leaves, and is easily reared. I beat lots of nettles this season, in the hope of being able to record an accurate description (the above is from memory), but I started too late (June 13th), and did

not secure a single caterpillar, except a solitary delicately green, leech-like one, with a small green head and segments, gradually increasing in size. It was all green, legs and claspers as well, without a single stripe or ornament, except a black lateral mark on each cheek, which, together with its quick spasmodic jerkings from side to side, gave it a vicious look. It was a larva of *P. pulchrina*. After spinning its white silken cocoon among nettle leaves, it emerged, a fine specimen, on the 5th of July.—J. ARKLE; Chester, July 18, 1891.

VARIATION IN PUPA OF SATYRUS MEGÆRA.—Out of a brood of about five dozen larvæ of *S. megæra* reared from the egg, I have obtained a very marked variety of the pupa, in which the usual emerald-green colour is replaced by sooty black, whence the double dorsal chain of bright yellow spots stands out in marked relief, giving the species an altogether different and, if possible, more handsome appearance. There are about one-fourth of the black variety, and four or five others are intermediate between bright green and black, being of a dull bice; the remainder call for no special notice. The larvæ were all reared under precisely similar conditions, on *Poa annua* and *Dactylis glomerata*, and the black pupæ were among the earliest to assume that state.—F. W. HAWES; Grasmere, Torrington Park, N.

NOTE ON THE HATCHING OF NEMEOPHILA PLANTAGINIS.—On June 13th I had several specimens of *N. plantaginis* emerge, a pair of which I placed in a cage, and saw them *in cop.* on the 14th. Eggs were laid on the 16th, all of which hatched on the 18th. This seems to me a very rapid proceeding, as the weather was not remarkably hot at the time, and they were not forced in any way, being virtually in the open air, but not in the sunshine. The female lived quite a fortnight longer, and laid more eggs, all of which were infertile. The larvæ have fed up very well, and are, I should think, nearly their full size now.—MARK H. WINKLEY; Streatham, July 21, 1891.

CHÆROCAMPA NERII.—In a collection of insects formed by the late Mr. Crozier, the well-known Manchester artist, mostly some forty to fifty years ago, and which has lately come into the possession of Mr. T. Ray Hardy and Mr. R. Standen, of Owen's College, was found a very fine specimen of *C. nerii*, brilliant in colour and perfect in condition, with the label, "Prestwich, 1847." This specimen the owners have generously allowed me to add to my collection. I may say that another individual of this species is in the museum collection of Owen's College, having been captured at light on a street-lamp in Prestwich five or six years ago. There are, therefore, now two *nerii* known from this locality—a locality rich in good things in time past, *e.g.*, *Catocala fraxini* (at Agecroft), *Saperda scalaris* (Mere and Prestwich Cloughs), &c.—J. COSMO MELVILL; Prestwich, July 3, 1891.

[Previous records of *C. nerii* are as follows:—Stainton's 'Manual,' 1857, three specimens, Dover, Teignmouth, Brighton. 'Entomologist's Weekly Intelligencer,' ii. 172, one imago, Brighton, 16th August, 1857; vii. 140, two larvæ, Eastbourne, 1860. 'Weekly Entomologist,' i. 12, one imago, Hastings, 2nd August, 1862. 'Entomologist,' iii. 364, one imago, Sheffield, 14th September, 1867: iv. 162. 'Entomologist's Monthly Magazine,' v. 172, two imagines?, St. Leonard's October, 1868. 'Ento-

mologist,' xiii. 162, one imago, Crieff, Perthshire, July?, 1873; vii. 290, one imago, near Lewes, 3rd September, 1874. 'Ent. Mo. Mag.' xiii. 138, one imago, Hemel Hempstead, 15th October, 1876. 'Entomologist,' xvii. 233, one imago, Tottenham, 12th September, 1884; one imago, Eastbourne, 24th September, 1884. 'Ent. Mo. Mag.' xxii. 89. 'Entomologist,' xviii. 218, one imago, Hartlepool, 23rd July, 1885; xix. 250, one imago, Brighton, 7th September, 1886. 'Entomologist,' xxi. 258, one imago, Poplar, 20th September, 1888. 'Ent. Mo. Mag.' xxvi. 328, one imago, Dartmouth, 26th September, 1890.—ED.]

LITHOSIA QUADRA AT NEW CROSS.—It may be of interest to note that I captured, on July 18th, a female specimen of *Lithosia quadra*. It was on a garden wall near New Cross Station, and is in fine condition. Is it not rather an unusual insect to be found in South London?—ALBERT E. COOK; 31, Lower Road, Rotherhithe, July 18, 1891.

HABITS OF LEUCOPHASIA SINAPIS.—In reply to Mr. H. S. Fremelin's enquiry respecting the habits of *Leucophasia sinapis* (Entom. 172), I beg to say that when catching butterflies in the neighbourhood of Wiesbaden, on July 29th, 1879, I noticed some examples of *L. sinapis* flying over a corn-field, and settling on the stems of the corn. On approaching one of these the insect would fly off a short distance and again settle. I took three specimens. The time would be about 5 o'clock in the afternoon. Perhaps the butterflies were settling for the night.—ALFRED SICH; Villa Amalinda, Burlington Lane, Chiswick, Middlesex, July 18, 1891.

NOTES FROM BROCKENHURST.—On the 30th May last I went to Brockenhurst, and spent the following week in collecting Lepidoptera. The weather was all that could be wished for, being warm, with bright sunshine every day. The following are the species I took or saw:—Hybernated specimens of *Gonopteryx rhamni* were fairly numerous during the first two or three days, but in a very battered condition. The females were more plentiful than the males. *Pieris rapæ* and *P. napi* were common. *Argynnis euphrosyne* was plentiful and in good condition, evidently not having been out long. *Nemeobius lucina* was fairly common in certain localities, seven specimens in one morning being the most I took. *Pararge egeria* was abundant, but in rather worn condition. *P. megara* was represented by two specimens only. I took one hybernated specimen of *Vanessa polychloros* on the 1st June, and also saw another on the 5th. *Thecla rubi* was not very common, four specimens being all I took. *Syrichthus malvæ* and *Nisoniades tages* were represented by three or four specimens each. *Cænonympha pamphilus* and *Lycæna icarus* were common. I was much surprised at not seeing a single specimen of *Euchloë cardamines*; as the season appeared to be very late, I fully expected to meet with it. Among the Nocturni there was not much to be done, very few moths being out. *Venilia macularia* and *Panagra petrarum* were fairly abundant, and I obtained a few *Eurymene dolabraria*. During the first two days *Bupalus piniaria* was to be seen flying about the tops of fir-trees. On the heaths, *Ematurga atomaria* was common, with two or three specimens of *Bombyx rubi*. *Euchelia jacobææ*, *Spilosoma mendica*, and *Euclidia glyphica* were each represented by one specimen. Night-work was not very encouraging. After what I had heard I did not attempt sugaring at all, while three or four nights mothing in the woods at dusk, and later, with the aid of a lantern, produced nil. The season seemed to be a very late one, several

of the trees and shrubs being barely in leaf. It was my first visit to the New Forest, and, considering the wet and cold weather we had during May, the result was better than I anticipated.—PHILIP W. RIDLEY; 2, Camden Terrace, Bath.

NOTES FROM READING.—Yesterday, the 16th July, a friend and myself set out to catch *Asthenia blomeri*, *Minoa euphorbiata*, and *Thecla w-album*. We took from 50 to 60 *blomeri*, 6 *euphorbiata*, 1 *T. w-album* (saw several others); and, in addition, got some 40 or 50 *Abraaxas ulmata*. I also had the fortune to find one more female *Stauropus fagi*. *S. fagi* occupied its usual position, *i. e.*, the N.E. side of a moderately-sized beech tree. *A. blomeri* we found chiefly on the trunks, and was somewhat difficult to capture; it has a habit of flying off and making for the underwood on the approach of its would-be captor, who must be nimble to secure it before it reaches a place of safety.—J. CLARKE; Reading, July 17, 1891.

VARIETY OF *HEPIALUS LUPULINUS*.—A very light specimen of *Hepialus lupulinus* was taken by me, at rest on an oak fence in Putney Park Lane, on June 14th. All four wings are of a dirty white, with no markings whatever.—CHARLES MAXSTED; 7, Church Terrace, Castelnau, Barnes, July 5, 1891.

[Mr. Adamson (Entom. xvi. 162) records a white specimen of *H. lupulinus* from Croydon, but this example had a broad tawny border on the costal margin, and a band of the same colour on the outer and inner margins. On page 187 of the same volume, Mr. Swinton says that white varieties of the species were common on the Old Guildford racecourse the first week in June. He adds, "I have been endeavouring to catch one quite white, but have not hitherto succeeded." Probably specimens similar to that described by Mr. Adamson are not scarce if looked for, but *H. lupulinus* is such a common moth that collectors do not perhaps give the species much attention. Some years ago I obtained a number of interesting varieties of this species in one evening at Kingsbury; amongst them were several of the white form, and since then I have frequently met with this variety in other places.—R. S.]

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*July 1st, 1891.*—Mr. Frederick DuCane Godman, M.A., F.R.S., President, in the chair. The Rev. John Isabell, of St. Sennen Rectory, Penzance, was elected a Fellow, and the Rev. John Seymour St. John, B.A., was admitted into the Society. Mr. Jacoby exhibited a specimen of a species of Coleoptera belonging to the family Galerucidæ, with the maxillary palpi extraordinarily developed. The Rev. Canon Fowler, on behalf of Mr. Wroughton, Conservator of Forests, Poona, exhibited specimens of a bug imitating an ant, *Polyrachis spiniger*, and of a spider imitating a species of *Mutilla*, and read the following notes:—"I have taken a good many specimens of a bug which has achieved a very fair imitation of *Polyrachis spiniger* (under the same stone with which it may be found), even to the extent of evolving a pedicel and spines in what, were it an ant, would be its metanotum. Curiously enough, however, these spines are apparently not alike in any two specimens. Is it that this

bug is still waiting for one of its race to accidentally sport spines more like those of *P. spiniger*, and thus to set the ball of evolution rolling afresh? or is it that the present rough copy of *spiniger's* spines is found sufficient to deceive? The bug has also been found in the Nilgherries. Mr. Rothney remarks on the above species:—"I have not found the species mimicking *Mutilla*; but in Calcutta and Barrackpore, where *P. spiniger* is a tree ant, forming its net by spinning together the twigs of a shrub, the mimicking bug also assumes arboreal habits, and may be found on the trunks of trees with the ants." Mr. Porritt exhibited living specimens of *Eupithecia extensaria* and *Geometra smaragdaria*: the position assumed by the former proved conclusively that it had rightly been placed in the genus *Eupithecia*. Mr. Crowley exhibited two specimens of a *Papilio* from the Khasia hills, belonging to an undescribed species allied to *P. papone*, sub-generic section *Chilades*. Col. Swinhoe remarked that he possessed a specimen from Northern Burmah. Mr. Moore and others took part in the discussion which followed. Mr. Dallas Beeching exhibited a specimen of *Plusia moneta*, recently taken by himself at High Woods, Tonbridge, and specimens of *Gonepteryx cleopatra*, lent him for exhibition, which were alleged to have come from the same locality. Mr. Algernon Chapman exhibited the larva of *Micropteryx calthella*, and read the following notes:—"The larvæ were obtained by placing moths in a cage with damp moss, dead leaves, and other *débris* off the surface of the ground. Into this the moths crept to a depth of half an inch, forcing their way into narrow cavities, and laid their eggs in groups of six or twelve. The eggs are clothed with fine hairs, tipped with refractive particles. The larva, about a millimetre in length, possesses on each segment eight processes of a globular form raised on a very slight pedicle. Besides the thoracic legs, each of the abdominal segments (eight) possesses a pair of minute jointed legs of the same type as the thoracic. There are also a pair of long jointed antennæ." Col. Swinhoe read a paper "On a new species of Heterocera from the Khasia Hills." Mr. Crowley read a paper "On a new species of *Prothoe*." Mr. C. J. Gahan read a paper "On the South American species of *Diabrotica*," Part II., being a continuation of Dr. Baly's paper on the same genus, published in the Society's Transactions for 1890, Part I. Mr. W. F. Kirby communicated a paper entitled "Notes on the Orthopterous family Mecopodidæ." Prof. Westwood communicated a paper entitled "Notes on *Siphonophora artocarpæ*," referring to an appendage of the eyes which had been overlooked in his previous description.—H. GOSS & W. W. FOWLER, *Hon. Secretaries*.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—*June 25th, 1891.*—Mr. W. H. Tugwell, President, in the chair. Mr. West exhibited bred examples of *Sesia formiciformis*, and remarked that he had bred a large number of ichneumons from the pupæ, and many others, he thought, were standing over. Mr. C. A. Briggs, a specimen of *Pieris brassica*, L., bred from pupæ received from Yorkshire, having one of the antennæ much smaller than the other, although fully developed. Mr. Croker, an hermaphrodite specimen of *Coremia ferrugata*, Clerck, a variety of *Spilosoma lubricipeda*, Esp., very strongly marked for the southern form of the species. Mr. Barker, a specimen of *Epinephela hyperanthes*, L., one of the inferior wings being about a quarter the size of the other; the ocelli were, however, to be seen. Mr. H. Moore, several species of locust. The Secretary read a list, compiled by Mr. Adkin, of Lepidoptera taken on the Society's excursion to Eynesford, Kent, on Saturday, the 20th June, which

was conducted by Mr. John T. Carrington. A list of the Coleoptera, compiled by Mr. Lewcock, was also read. Mr. Tugwell communicated notes on a botanical ramble from Leatherhead, over Mickleham Downs, to Dorking, illustrating his remarks by examples of the plants collected, and referring to the larvæ of the Lepidoptera which were to be found feeding on them.

July 9th, 1891.—The President in the chair. Mr. R. Adkin exhibited, on behalf of Mr. E. Sabine, of Erith, a series of *Lycæna icarus*, Rott., collected at Snodland during the spring, and showing great variation; some of the males closely approached the colour of *L. bellargus*, Rott.; in one, the marginal black dots extended into the fringes; in one of the specimens the under side was of a smoky grey colour, the white rings of the ocelli being absent. Among the females were many blue forms, and in the under sides of many there was considerable variation. Mr. Adkin also exhibited living larvæ of *Euclidia glyphica*, L., reared upon white clover. Mr. Oldham, a light form of *Argynnis euphrosyne*, L., a yellow variety of *Pieris rapæ*, L., and a dark variety of *P. napi*, L. Mr. C. A. Briggs, a few melanic specimens of *Sphinx ligustri*, L., from the London district. Mr. Tugwell, *Sesia sphegiformis*, Fabr., and stems, showing position of pupæ *in situ*, from Tilgate Forest, and made some observations thereon. Some remarks were made by members as to varieties being mobbed by typical forms of the species. The Rev. J. W. Horsley, of Woolwich, exhibited and remarked on a series of shells, those of *Helix nemoralis* and *H. hortensis* in almost every variety of banding and colouring. He had made a list of 89 band varieties.—H. W. BARKER, *Hon. Sec.*

OBITUARY.

GEORGE PERRY SHEARWOOD died 7th July, 1891, aged 62. The earlier portion of his life was spent in India, where he for some years carried on a successful business, from which he obtained a considerable competency, and retired to this country at a comparatively early age. It was while in India that he contracted a taste for Natural History, and commenced collecting such objects as they came in his way. On returning home his attention was devoted chiefly to ferns, of which he at one time had a very large number of living examples, and Lepidoptera, to which he gave a large share of his leisure, the British species being his especial favourites, and of these he amassed a very considerable and fairly complete collection. He also took great interest in rearing and preserving the larvæ of Lepidoptera: a rare or little-known species in its larval state being one of his great delights. By those who knew him in the field will his loss be most felt, his genial nature and utter disregard of fatigue rendering him a most agreeable companion. He thoroughly enjoyed an expedition in quest of some pet species, and it was on one of these occasions that he met with an accident that incapacitated him for some time from active work. Having lingered too long in quest of *Erastria venustula*, which he had been seeking in the Horsham district, and thus missed the last passenger train by which he might reach home, he sought other means of accomplishing the journey before resorting to the extremity of a forty miles' walk. This presented itself in the form of a friendly driver of a goods train, who eventually deposited him, in the small hours of the morning, on the line some distance

from a station, and to gain the road it was necessary for him to scale a high spiked fence; this he accomplished without difficulty, but in his descent his hand was caught by one of the spikes, and torn almost through. Nothing daunted by the pain and loss of blood, he bound it up as best he could, and made for home, rousing his doctor on the way, under whose care he remained for some weeks, and, on recovery, appeared to regard with pride the scar which he carried to the grave. He contributed little to entomological literature, beyond a few notes in the 'Entomologist' upon interesting captures that he had made from time to time, and, so far as we are aware, he has left no systematic record of his doings. He was one of the earliest members of the South London Entomological Society, to which he belonged until his death. Although possessed of a considerable fortune on his retirement from active business, a too implicit faith in sundry commercial undertakings considerably reduced his income. This perhaps preyed upon his mind, and, an attack of paralysis supervening, he was placed in a helpless condition, and his brain seriously affected; but even during his last years, although so terribly afflicted, he derived relief and pleasure from the re-arrangement of the collections that he had formed during his earlier life. We understand that these are likely shortly to be offered at auction.—(R. A.)

On the 12th inst., after months of suffering brought on by an attack of influenza, Mr. EDWARD RALPH PEARSON, of Wallington, Northumberland, passed to his rest. Turning his trade, which was that of a joiner, to meet his entomological aspirations, he, in his spare hours, made himself a cabinet, which, with its very representative collection of insects found in the North of England, soon became an object of general interest and admiration. In addition to his local fame as an entomologist, Mr. Pearson was also a successful horticulturist. Amongst the many good insects in his cabinet, his collection included long and fine Wallington series of *Sphinx convolvuli*, *Thyatira batis*, and *Plusia bractea*. It is also worth recording that he had, some twenty years ago, captured, at a short distance from his home, a fine specimen of *Vanessa antiopa*. To many entomologists Mr. Pearson was well known as a correspondent and ready helper, and his early death, at the age of 56, will be regretted by all who knew his sterling worth.—(J. A.)

It is with deep regret I have to announce the sudden death of my old friend P. F. J. LOWREY, which took place at his residence at Clapham Park on the 24th July, 1891, at the early age of thirty years. He was an ardent and careful collector of Lepidoptera, caring little for the exchange system of collecting; his fine collection of butterflies is formed principally of his own captures, and comprise many of our most local species; it includes specimens of *Vanessa antiopa*, one taken by himself at Camberwell eleven years ago. Only a month since I had the pleasure of his company on a visit to the Isle of Wight, in search of one of his favourite butterflies, *Melitæa cinxia*. During the last fourteen years he has contributed notes to the 'Entomologist.' He was much devoted to the study of Ornithology, and was well acquainted with all rural recreations. His loss will be deeply felt by all those who had the fortune of his friendship, as he was a true friend to all.—(F. W. F.)

With very great regret we have also to record the death of Mr. FERDINAND GRUT, of Southwark. A further notice will be given in the September number.—Ed.

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TWO AND A HALF HOURS' INVESTIGATION OF THE ENTOMOLOGY OF OXSHOTT.

By T. R. BILLUPS, F.E.S.

On the 8th of July last I went down to that pleasant and easily accessible locality in Surrey known as Oxshott. I was accompanied by my friend Mr. A. Beaumont, and it is perhaps unnecessary to say that our object was to add, if possible, some rare insects to our collections. As the district visited by us is now well known to most of our London entomologists, I need hardly enlarge upon its physical or botanical features. The particular day referred to was not, from a meteorological point of view, a favourable one for collecting, and our captures were consequently few and far between. A heavy thunderstorm brought our proceedings to an early termination, and caused us to beat a hasty retreat to the railway station. On our way to the place of shelter we happened to pass by a private road bordered on each side by a sand-bank, but as the rain was falling in a veritable torrent, we could only glance at the position then, making mental notes that the ground was of a promising character, and that we ought to visit it again under more favourable circumstances. On the morning of the 11th July the sun shone brilliantly in a cloudless sky, the wind was blowing gently from the south-west; altogether the day promised to be all that could be desired, and, as I was free, I determined to investigate the entomological capabilities of the spot which had so favourably impressed me on my former visit to Oxshott. Unfortunately I had to make the second expedition by myself, as Mr. Beaumont was not able to join me. The following is a list of some of the species captured by me in the short space of 150 minutes:—

HYMENOPTERA.—Amongst the Heterogyna and Fossorial were *Formica rufa* and *Myrmica scabrinoides*, very plentiful. *Myrmosa melanocephala*, both sexes of this not common insect were taken,

the males being on flowers. *Pompilus viaticus* and *P. gibbus* were very common; a solitary male of the rarer *P. pectinipes* was also taken. *Priocnemis fuscus* and *Ammophila campestris* were plentiful. *Tachytes pectinipes* and *Miscophus bicolor*, the latter and rarer species being very difficult to catch. *Diodontus minutus* and *D. luperus* were both taken, as also several specimens of *Pemphredon lethifer*. *Mimesa bicolor* and *M. equestris* were swept from Umbelliferae; several specimens off *Harpactus tumidus*. Two specimens of *Gorytes mystaceus*, as also *Mellinus arvensis*, were taken, the two latter being from the leaves of a stunted oak, where they were apparently in search of lepidopterous larvæ. *Cerceris arenaria* was common. *Trypoxylon figulus* and *T. clavicernum* were taken, but not commonly. Amongst the Crabros, a solitary specimen of the rare *C. capitatus* fell to my net, the other species taken being *podagricus*, *varius*, *wesmaeli*, *elongatulus*, *vagabundus*, *4-maculatus*, *cribrarius*, and *peltarius*. *Entomognathus brevis* was very abundant. The Diptera were represented by *Vespa germanica*, *Odynerus parietum*, and a single female of *Eumenes coarctata*. In the family Anthophila *Colletes succincta* and *C. fodiens* were common on the ragwort (*Senecio jacobæa*), while the bramble-flowers swarmed with *Prosopis communis* and *P. hyalinata*. *Sphecodes gibbus*, *pilifrons*, *similis*, and *variegatus* were captured at the bloom of thistles; and two specimens of the rare *S. longulus* were taken by sweeping. *Halictus cylindricus*, *albipes*, and *tumulorum* were in plenty, while specimens of *H. punctatissimus* were scarce. *Andrena bicolor* was common at the bloom of the mallow (*Malva sylvestris*); *A. fulvicrus* and *A. afzeliella* were also plentiful, but *A. chrysoscelis* was represented by two specimens from the bloom of Umbelliferae. *Nomada fabriciana* and *N. furva* were both taken, but much worn. Two specimens of *Cælixys elongata* and one specimen undetermined complete the list of captures of the Hymenoptera-Aculeata.

CHRYSIDIDÆ.—In this family I succeeded in taking three specimens of the rare *Elampus panzeri*, by sweeping a small clump of viper's bugloss (*Echium vulgare*). Several examples of *Homalus auratus* and *Chrysis ignita* occurred, as also one specimen of the rare *C. succincta*.

ICHNEUMONIDÆ.—As my captures in this family were very numerous, and not all at the present determined, I propose giving the names of those identified, simply stating that they were all taken by sweeping. *Ichneumon xanthorius*, *I. latrator*, *Exophanes exulans* (both sexes), *Amblyteles palliatorius*, *A. castigator*, *Platylabus pedatorius*, *P. dimidiatus*, *Stilpnus gagates*, *Phygadeuon brevis*, *P. jejunator*, *P. variabilis*, *P. fumator*, *Hemiteles tenebricosus*, *Aptesis hemiptera*, *Pezomachus rufulus*, *Campoplex erythrogaster*, *C. pugillator*, *Sagaritis latrator*, *Limneria crassicornis*, *L. uncinata*, *L. interrupta*, *L. ovata*, *Canidia pusilla*,

Banchus pictus, *Perilissus pictilis*, *P. variator*, *P. vernalis*, *Tryphon consobrinus*, *Adelognathus ruthei*, *Polyblastus varitarzus*, *Cteniscus sexcinctus*, *Exochus carbonator*, *E. mansuetor*, *Bassus bizonarius*, *B. cinctus*, *B. exultans*, *B. lætatorius*, *Pimpla scanica*, *P. examiner*, *P. graminella*, *Lissonota sulphurifera*, *L. cylindrator*, *L. variabilis*. The subfamily Braconidæ had representatives in *Bracon roberti*, *B. terebella*, *B. discoideus*, *Rhogas circumscriptus*, *Chelonus inanitus*, *C. submuticus*, and three specimens of the rare *C. carbonator*. *Microgaster globatus* and *M. annulipes* were common. *Microdus tumidulus*, *Microplitis spectabilis*, *Meteorius chrysophthalmus*, *M. pulchricornis*, *Aphæreta cephalotes*, *Cælinius niger* (several of both sexes), and *Rhizarcha areolaris*. In the family Oxyura there were taken *Proctotrypes gravidator* and *P. viator*, *Megaspilus alutaceus*, *Galesus fuscipennis*, *Paramesius claviscapus*, and *Spilomicrus nigripes*. In the family of Chalcididæ the following were met with: five specimens of the very curious *Eupelmus degeeri*, *Lamprotatus splendens*, *Pteromalus tibialis*, and *P. fasciventris*. The Cynipidæ, or Gall-flies, were represented by *Cynips kollari* and *Rhodites rosæ*. Amongst the Tenthredinidæ, or Sawflies, the following were taken: *Tenthredo viridis*, *Tenthredopsis nigricollis* (both sexes), common on the Umbelliferae. *Dolerus intermedius*, *D. fulviventris* (the latter being very plentiful amongst the horse-tails). *Strongylogaster cingulatus* (by sweeping *Pteris aquilina*), *Selandria stramineipes* and *S. morio* (both by beating birch). *Taxonus glabratus* and *Athalia rosæ* were very common. *Dineura virididorsata* and *Cladius pectinicornis* were also plentiful. *Nematus capreae* in all its varieties was very plentiful; *N. myosotidis* and *N. ribesii* were numerous. Several specimens of the not common *Cephus phthiscus* were also taken.

DIPTERA.—In this Order I was especially fortunate, capturing several species that I have no doubt will prove interesting to dipterists, more particularly as I find that four of the species are placed at the end of Mr. Verrall's List of British Diptera as reputed British; another is placed in his list in italics, as though he had doubt as to its being a British species; while two other species do not appear in his list at all, unless, indeed, he has them under another synonym. *Oxycera pulchella*, five of this pretty little species of Stratiomydæ were taken, as also two of *O. terminata*; this latter species, which I had previously bred from a pupa found in my own garden on the 16th of July last year, is one of Mr. Verrall's reputed British. *Chloromyia formosa*, *Beris clavipes* and *B. chalybeata* were common. A single specimen of *Tabanus bromius* was taken, while *Chrysops cæcutiens* and *C. relictus* were perfect pests. *Chrysophilus auratus* literally swarmed, while *Leptogaster cylindricator*, *Dioctria baumhauerri*, and *Thereva fulva* were plentiful. Two specimens of the curious *Oncodes gibbosus* fell to my net, while *Hybos femoratus*, *Rham-*

phomyia sulcata, and *Empis livida* abounded. Several specimens of the pretty *Argyra leucocephala* and *Pipunculus ater* were taken, as also two specimens of *P. geniculatus*; of the latter species Mr. Verrall is probably doubtful, as I find it in italics. *Pipizella annulata*, one specimen of which was captured, Dr. Meade says rare; Mr. Verrall places it with the reputed British. Several specimens of *Chilosia astracea* were taken, while *Sphærophoria scripta*, *S. menthastri*, *Xanthogramma ornatum*, *Volucella bombylans*, and *V. pellucens* were plentiful. I only found a single specimen of each of *Sericomyia borealis*, *Eristalis florens*, *Helophilus pendulus*, and *Xylota segnis*. *Chrysotoxum arcuatum*, *C. bicinctum*, *Sicus ferrugineus*, *Myopa buccata*, and *Oliviera lateralis* were all taken. *Phorocera concinnata*, *Thelaira leucozona*, and *Mydæa urbana* were plentiful. *Cordylura albipes* seemed scarce. Two specimens of another of Mr. Verrall's reputed British Diptera were taken in *Clidogastra punctipes*, Mg., a single specimen of the very beautiful *Pteropæcila lamed*, and several of *Pteropæctria afflicta* and *P. frondescentia* were captured, as were also *Trypeta onotrophes* and *Acidia cognata*, which seemed common. The very pretty *Trypeta florescentia* was plentiful, while three specimens of another rarity, *Oxyphora* (*Tephritis*, L.) *arnica*, Fln., were taken; this is also reputed British by Mr. Verrall. *Sapromyza platycephala*, Lw., and *Chlorops hypostigma*, both of which species were taken, terminate the list of Diptera, the two latter species being those I previously alluded to as not appearing in Mr. Verrall's list.

In Hemiptera some 17 species were taken, while Coleoptera numbered 27 species, as also three of Orthoptera; but as I may have to give a future note on several so far undetermined species, both of Ichneumonidæ and Diptera, I purposely omit the names now, as this paper is already longer than I had anticipated it would be. I must, however, tender my best thanks to my friend Mr. Edward Saunders for his kindly identification of the obscure Hymenoptera, and also to Dr. Meade for his invaluable aid in identifying some of the Diptera.

NOTE ON *SESIA SPHEGIFORMIS*, FABR.

By W. H. TUGWELL.

FOR many years past I have had the pleasure of studying this interesting species in one of its most favoured habitats, viz., Tilgate Forest, Sussex, and possibly a few notes may be useful to others.

The species is widely distributed over a fairly large area, where its food-plant, alder, occurs; it does not affect densely

wooded plantations, but rather the outskirts, and isolated bushes or shrubs. The larvæ may be found in stems no thicker than your little finger, to that as large as a man's leg, and they feed at least three years; in fact they are in larval state during part of four years, *viz.*, ova deposited, say June, 1891, will not pupate until May, 1894. The larva does not, I think, feed the last spring of its larval life, but it finishes its burrow and provides for the future exit of imago; so that if, in the spring, one finds fresh frass being ejected from the end of the burrow, it is useless to take it that year, as it is almost impossible to rear half-fed larvæ, save, perhaps, in cases where one has growing plants to introduce them in; generally it will be found much better to note the tree, and leave them until the following May. They only remain in pupa about a month, and may be found as imagines from end of May until first week in July. My first date of capture of perfect insect, at large, is *May 29th*, on which date, in 1882, an early season, I and a friend captured four examples,—two females, at large, one of them flying, apparently depositing ova; and a pair *in cop.* One cold and backward season I took a female, just as it emerged from pupa, on *July 6th*. The general time, however, is about the first to second week in June. They are not often found at large, unless you have a virgin female, and then, given a favourable day, you possibly may get good sport, but not always.

Thus, this June 19th, I took two virgin females, that I had bred, to Tilgate Forest, selected a likely spot, and had splendid sport; in fact, took twenty-four fine males. This was the best take I ever had; the day was all that could be desired, and the result most satisfactory.

A week later I again took two virgin moths to Tilgate, with weather, so far as one could judge, equally favourable; but, for result, I only saw one male. This was surprising, as it was hardly possible that the males were exhausted; it was rather, I am disposed to think, some special meteorological reason unappreciable to our blunter senses. (N.B.—The wind was S.W. and soft.)

It is curious to watch for the approach of the males. They come up to the caged female, in a booming flight that is unmistakable, and are most readily captured; but if once really frightened, then they are off like a rocket; the eye cannot follow their rapid flight; so different to the would-be lover. It is very rare, indeed, that you can find a male on flight, except you are aided by a virgin moth; occasionally you may detect one sitting on a leaf, but very rarely. Your best chance of success is in breeding, and possibly by attraction, although this fails sometimes. I have never had but this year perfect success, against which I could name a lot of failures, so much depends on the weather; you may get your females out and not have a favourable day until the

freshness of your moths has gone by, and thus lose your chance for the season.

This 1891 is the best year for the species I ever experienced. By breeding and captures I obtained forty-seven fine examples.

July, 1891.

ENTOMOLOGY OF GRANADA AND NEIGHBOURHOOD.

By THE REV. F. A. WALKER, D.D., F.E.S.

(Concluded from p. 163.)

GRANADA.

COLEOPTERA. — *Acis acuminata*, *Oxytherea stictica*, *Cetonia hirtella*, *C. squalida*, *C. floricola*, *C. aurata*, *C. opaca*, *Hoplia aulica*, *Anisoplia horticola*, *Clythra vicina*, *Trichodes octopunctatus*, *Coccinella septempunctata*, *Silpha rugosa*, *Heliotaurus ruficollis*, *Atenichus laticollis*, *Dolichosoma nobiles*, *Phytæcia virescens*, *Helops* (sp. incert.), *Tentyria* (sp. incert.), *Gymnopleurus flagellatus*, *Gonioctena ægrotæ*, *Chrysomela palustris*.

LEPIDOPTERA-RHOPALOCERA. — *Papilio machaon*, *P. podalirius*, *Pieris brassicæ*, *P. rapæ*, *P. daphnidice*, *Gonepteryx rhamni*, *Colias edusa*, *C. hyalæ*, *Zegris menestho*, *Euchloë belemia* var. *glauce*, *E. eupheno*, *Vanessa atalanta*, *V. cardui*, *V. urticæ*, *Satyrus meone*, *S. megæra*, *S. mæra*, *Epinephele ianira*, *E. pasiphæ*, *E. ida*, *Arge psyche*, *A. thetis*, *Melitæa phœbe*, *M. cinxia*, *Chrysophanus phlæas*, *Polyommatus alexis*, *P. adonis*, *P. agestis*, *P. hylas*, *Erynnis altheæ*, *Pyrgus sao*, *P. proto*.

LEPIDOPTERA-HETEROCERA. — *Macroglossa stellatarum*, *Ino statice*, *Saturnia pyri*, *Cerura vinula*, *Arctia villica*, *Plusia gamma*, *Agrotis segetum*, *Aspilates citraria*, *Synaphe moldavica*, *Rhodostrophia vibicaria*.

DIPTERA. — *Tabanus ater*, *T. autumnalis*, *Sarcophaga* (sp. nov. ?), not in B. M., nor described in Schiner's work; proposed to call this sp. *granadensis*, *Tachinus? fera?*, *Gonia* (sp. incert.), *Sarcophaga*, *Tabanus* (sp. incert.), *Asilus*, *Eristalis tenax*, *E. arbustorum*, *Dasypogon* (sp. incert.), *Laphria* (sp. incert.), *Dexia* (sp. incert.), *Bombylius* (Acroceridæ).

HEMIPTERA. — *Lygæus militaris*, *Pyrrhocoris ægyptius*, *Hydrometes* (sp. ignot.), *Rhaphigaster griseus*, *Cydnius aterrimus*, *Pentatoma buccarum*.

HYMENOPTERA. — *Xylocopa violacea*, *Dielis aurea*, *Vespa germanica*, *Polistes gallicus*, *Apis mellifica*, *Andrena nigro-ænea*, *A. albicans*, *Andrena funebris* (only one in B. M.), *Andrena* (sp. incert.), *Panurgus* (sp. incert.), *Osmia cornuta*, *Anthophora nidulans*, *Eucera hispana*, *E. nigrilabris*, *E. trivittata*, *Camponotus herculeanus*, *Pompilus fuscus*, *Ammophila lularia*.

NEUROPTERA. — *Libellula depressa*, *Æschna* (possibly *mauricianæ*), *Lestes sponsa*, *Sialis lutarius*, *Chrysopa* (sp. incert.), *Ascalaphus ictericus*.

LANGARON.

COLEOPTERA. — *Cetonia hirtella*, *Oxytherea stictica*, *Trichodes octopunctatus*, *Blaps gigas*, *Carabus bæticus*, *Asida solieri*, *Helops* (sp. incert.), *Geotrupes hypocrita*.

LEPIDOPTERA-RHOPALOCERA. — *Papilio machaon*, *Pieris brassicæ*, *P. rapæ*, *P. daphnidice*, *Colias edusa*, *Euchloë eupheno*, *Vanessa atalanta*, *V.*

urticæ, *Satyrus megæra*, *S. mæra*, *Epinephile ianira*, *Chrysophanus phlæas*, *Polyommatus alexis*, *Melitæa phæbus*, *M. cinxia*, *Pyrgus sao*.

LEPIDOPTERA-HETEROCERA.—*Abrostola triplasia*.

DIPTERA.—*Anthrax* (sp. incert.), *Tipula* (sp. incert.).

HEMIPTERA.—*Lygæus militaris*, *Pyrrhocoris ægyptius*.

HOMOPTERA.—*Trieophora sanguinolenta*.

HYMENOPTERA.—*Polistes gallicus*, *Xylocopa violacea*, *Melecta punctata*, *Osmia ænea*, *Polynerus* (sp. incert.), *Allantus* (sp. incert.), *A. dispar*.

NEUROPTERA.—*Libellula depressa*, *Limnephilus griseus*?

GIBRALTAR.

COLEOPTERA. — *Nacerdes melanura*, *Heliotaurus ruficollis*, *Cetonia squalida*, *C. hirtella*.

LEPIDOPTERA-HETEROCERA.—*Zygæna* sp. —?

HYMENOPTERA. — *Anthidium* (sp. incert.), *Polistes gallicus*, *Odynerus quadratus*, *Apis mellifica*.

DIPTERA.—*Idia* sp. —?, *Syrphus balteatus*.

HEMIPTERA.—*Lygæus militaris*.

MALAGA.

LEPIDOPTERA-RHOPALOCERA.—*Satyrus meone*, *Colias edusa*.

DIPTERA.—*Eristalis tenax*.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. PERRY COSTE, F.C.S., F.L.S.

(Concluded from p. 192.)

After this exceedingly brief reference to a few cases of variation that illustrate my argument, I will venture to indulge in a little prediction. We are often told that the power of prediction is the test of a theory's correctness, and I am bold enough to predict with considerable confidence that the following varieties will somewhere or at some time be found naturally occurring. Indeed, it is highly probable that many of them have long since been found and chronicled, but if so I am ignorant of the fact. It will be understood that these unknown varieties are predicted on the strength of the evidence now amassed as to the nature and constitution of the pigmental colours, and are in no sense, of course, intended to be exhaustive of the subject. I merely take typical species, and predict variations which one may expect to occur similarly in other species with similar colouring. I shall take as a guide the tabulation given last year,* and will notice first retrogressive varieties, taking the colours *seriatim*:—

Yellow and Orange.

E. cardamines (male).—Pale or colourless varieties.

G. rhamni.—Pale varieties; colourless less likely.

* Entom. xxiii. 248—252.

G. cleopatra.—Varieties with no orange flush; possibly also white (*i. e.*, colourless) varieties.

Abraxas grossulariata.—Varieties with no yellow marks.

Chestnut.

V. io and *antiopa*.—Varieties with black upper surface.

V. urticæ.—"Sun-bleached" varieties; *i. e.*, the chocolate replaced by a colourless colour, as seen on the lower surface normally.

Argynnis, *E. tithonus*, *C. pamphila*, *Hesperidæ*, &c. — More or less whitish ("sun-bleached") varieties should be found of all these, but especially of *C. pamphila*.

Red and Pink.*

V. atalanta.—Red replaced by *cardui*-brown.

P. apollo.—Yellow-spotted varieties.

Sphinxes.—Pink replaced by yellow or almost white.

Catocala nupta, &c.—Yellow varieties.

And similarly yellow varieties of all species marked with "the normal red."

Green.

H. prasinana, *Moma orion*, *D. aprilina*, *L. viridaria*, *G. vernaria*, *H. strigata*, *M. margaritaria*, *Tortrix viridana*. — Yellowish or white varieties of these and all such green species (as well as of the green *Papilio*s, such as *codrus*, &c.). Probably, however, in many of these green species such white varieties are frequent, owing to the *fading*.

Furthermore, among *physical* colours, I should expect the bronze-brown variety of such green species as *Argynnis*, *Ino*, and *Thecla rubi*.

In the next place, as to progressive varieties, we might get pale yellow or chestnut varieties of any white species; but there can be no sufficient reason for predicting such variation of any given species, unless either a nearly allied species is already so coloured, or unless the species in question is itself already slightly marked in this way: for instance, *A. grossulariata*, which normally possesses a row of yellow spots, has occurred as an entirely yellow variety. In exactly the same way we should never be surprised at a red variety of any yellow species, but we have no grounds for definitely predicting it in any given species unless allied species already possess red markings. Thus I should consider red varieties of *Arctia villica*, and of the normally orange *Catocalæ*, as pretty certain to turn up some day; and furthermore, on the strength of the cyanide experiments, I should anticipate red or red-marked varieties of the species of *Colias*, *Gonepteryx*, *Terias*, &c.

* My contention that the retrogressive coloric varieties are due to general unhealthiness of the conditions received another confirmation by Mr. Mitchell's note in the July number of the 'Entomologist' (p. 171), where he chronicles the emergence of an *abnormally small and pale* specimen of *B. quercus* from a badly wounded pupa.

In accordance with what has been previously stated,* it appears not improbable also that green varieties of pale yellow species, and very occasionally red varieties of some chestnut species, may be found. It is scarcely necessary to point out that while there are definite data for predicting retrogressive varieties for any given coloured species (the genealogy of whose colour is known), there are no such reasons for predicting progressive variation, *i. e.*, an advance to a higher colour, which the history of other species shows to be possible, but cannot show to be inevitable. Enough has, however, now been said to show along what lines we should look for coloric varieties.

There now remains one further point only for discussion, *viz.*, the genetic relations of white, yellow, and red. I had originally supposed that it would be necessary to argue this at some length, in order to convert those who may have adopted Mr. Cockerell's views; but I think that by this time the amount of evidence that has been detailed, bearing more or less directly on this discussion, renders any lengthened argument at this stage superfluous.

Mr. Cockerell proposed—if I understand him—as a hypothetical explanation, that the primeval† colour was yellow, that from this was evolved white, and from (?) this again red. I think, however, that the evidence brought forward in these articles may be considered absolutely to demonstrate the incorrectness of this view, and to show that the order has been white, yellow, red. Both the experimental evidence and the entomological evidence (*i. e.*, of variation, &c.), are dead against Mr. Cockerell's view. Red and yellow are proved to be pigment colours, white is not: are we to suppose that originally there was a yellow (*i. e.*, pigmental) wing; that then, by an evolutionary advance, a white (*i. e.*, unpigmented) wing was produced; and then, finally, a red (*i. e.*, pigmented)? Again, on such a view it is incomprehensible that yellow varieties of red both occur naturally, and appear as the result of chemical reagents acting on red species; while white varieties are almost, if not quite, unknown in nature, and very rare in experiment, and then only as subsequent to yellow. Moreover, the one or two instances in which I have obtained white wings from red form the last link in the chain of evidence, and are absolutely convincing against such a view; for, as has been already stated,‡ if we take *Delias hierte* or *eucharis*, we have side by side red, yellow, and white: acids instantly turn the red to yellow, and then this yellow and the original yellow alike dissolve, leaving a pure white wing.§ Nothing could more plainly demonstrate that the genetic order of the colours is white,

* Cf. Entom. xxiv. pp. 118, 119, and 138, 139.

† I do not mean of *all* species, of course.

‡ Entom. xxiv. 13.

§ Cf., too, *G. cleopatras*.

yellow, red. In fact, to suppose that white occurs between yellow and red is to lend ourselves to utter absurdities.

Furthermore, I have shown how closely allied are yellow and chestnut: if, therefore, we suppose yellow anterior to white, equally so must we place chestnut: and then we should be flying in the face of all entomological evidence. We should have to consider all the "sun-bleached" or milk-white varieties of the chestnut species as progressive varieties to the higher stage of white! I do not think that any one who has ever compared a natural or artificial "bleached" variety with the richly coloured normal insect will give this contention a second thought. Furthermore, we should be logically bound to consider the pale (*i. e.*, white) female of *G. rhamni* as a progressive advance on the deep yellow of the male, and the white variety *helice* of *Colias edusa* as an advance on the conspicuous orange of the type; but this is simply to meet the certain fate of being crushed by the whole weight of biological evidence that shows the general advance from pale to bright and conspicuous colours;* indeed, it scarcely seems worth while to follow this question further. I may refer, however, to a passage in Wallace's 'Tropical Nature' (pp. 204, 205), in which he describes how in *Pieris pyrrha*, *molenka* and *lorena*, the males are plain white and black, whilst the females are orange, yellow, and black, and so banded and spotted as to exactly mimic certain Heliconidæ; the gist of the whole passage being that (in this case) the females have acquired these yellow colours, whilst the males preserve their *old markings*: what is this but advance from white to yellow? Moreover, Mr. Cockerell's own remarks on *Euchloë cardamines* are a condemnation of himself; for, in a paper read before the South London Entomological Society, he proposes† the view that this genus has arisen in comparatively recent times as an "offshoot from an old *Pieris* stock," *i. e.*, therefore that the orange and yellow colours of this genus are derivative, and the white primeval; not *vice versâ*. But it is possible that Mr. Cockerell may repudiate some of the arguments‡ that I have been combating here: it is possible that he might conceive yellow to be the original colour from which, on the one hand, red has been evolved by an alteration of the pigment, and, on the other hand, white by a destruction

* Except, of course, in cases where concealment is necessary.

† Entom. xxii. 143.

‡ Since writing the foregoing I have turned up a note made some time since, with a reference to the 'Entomologist' (xxi. 113). There I see that Mr. Cockerell apparently *does* propose to so derive red from yellow, as well as white from yellow; but I do not gather so much that he proposes the scheme referred to in the text (*i. e.*, the same yellow giving rise to both white and red), but rather looks upon red as derived from one yellow, white from another. Of course, when his remarks were written there was practically no experimental evidence at hand on this subject. The only single support I have met with for Mr. Cockerell's views on the derivation of white from yellow, is a remark by Kirby ('European Butterflies and Moths,' p. 8), that *Bryonia* appears to have been the early form of *Pieris*, and was yellow.

thereof. This would avoid the absurdity of interpolating white between yellow and red, but it is open to the following objections: that there is no evidence in its favour, that it is in opposition to the arguments just advanced in favour of the evolution of yellow and chestnut from white, and that it is not easily reconciled with the existence of such species as *Delias*. But, indeed, I am vain enough to think that Mr. Cockerell, who, after all, only advanced his hypothesis doubtfully—provisionally (as he himself remarked in a note to me)—has long since been convinced by my arguments and experiments.

And here, then, I must take leave of my readers, whose patience, I trust, has not been overtaxed by a series of articles running through seventeen months. I doubt not that many corrections and modifications will need to be made at all points in the theories to which I have been led by my experiments; but it will be a sufficient satisfaction to me if I shall have succeeded in laying fairly secure foundations where previously building—otherwise than by airy hypothesis—was chiefly conspicuous by its absence. I hope to continue my work as opportunity permits, and especially to investigate the colour of larvæ, for which work, however, I have at present no material. But if others who have the opportunity will investigate the colours of other orders, such as Coleoptera and the like, I shall be interested to know what bearing, confirmatory or otherwise, their work may have on my theories.

ERRATA.—Page 166, line 17, for “there is reason,” read “there is no reason”; p. 167, line 15 from bottom, for “*nireus*” read “*niveus*”; p. 168, bottom line, for “efficacy of the first to cause,” read “efficacy of this factor in causing”; p. 189, line 8 from top, for “and of what,” read “and examples of what,” &c.; p. 190, line 16 from top, for “e. g. *Delias*,” read “e. g. in *Delias*.”

ABUNDANCE OF LEPIDOPTERA IN NEW ZEALAND.

By W. W. SMITH.

MR. R. ADKIN's additional observations “On the occasional abundance of certain species of Lepidoptera” (Entom. xxiv. 60), together with the same gentleman's appreciative and suggestive comments on a kindred paper of my own (Entom. xxiii. 305), has induced me to contribute some further notes on the subject. When I referred to Mr. Adkin's original and interesting paper (Entom. xxiii. 177) dealing with the “sporadic abundance” of certain species in the British Islands, I was fully aware that he sought to explain, or suggest, the probable causes *only* of the sporadic occurrence of such species, and not to deal with the subject on general principles as applicable to all species in

seasons when most Lepidoptera were unusually numerous. The gist of my own paper more especially dealt with the subject on broad principles, and I explained one cause which unquestionably produced the great abundance of many species of Lepidoptera last season in New Zealand. In his original paper Mr. Adkin enumerates over a dozen species which appear sporadically in the British Islands, and after discussing the evidence of such, concludes, "however incomplete it may be, tends to the conclusion that immigration is a chief factor in the causes of great abundance occasionally observed, and in some instances the direct and only cause." Referring to my remark that immigration could have no bearing on the question in New Zealand, Mr. Adkin says, "I cannot admit that this greater distance would form an insurmountable obstacle to immigration; if it were so, it seems highly improbable that that essentially New World species, *Anosia plexippus*, would have reached Great Britain; and except for this greater sea space, the relative position of the British Islands and New Zealand to their respective Continental bases are singularly alike," and adds, "That migrations of Lepidoptera from the Continental portion of the European area to the British Islands do occur has already been shown, and is it not reasonable to suppose that a similar condition of things exists in regard to New Zealand?" Let us briefly consider these remarks. The dispersion of *Anosia plexippus* in late years over the greater part of the known world presents an interesting problem, which, when perfectly solved, should explain many of the apparent anomalies in the geographical distribution of Lepidoptera. I am not well versed in the literature of the subject, at least so far as it deals with the modes of dispersion of this species. But its occurrence at the Antipodes is even more remarkable than in the British Islands. It was first captured in New Zealand by Mr. F. W. Sturm, up the Wairoa River, Hawkes Bay, North Island, in December, 1840, and subsequently on the Rangitikei River, on the western side of the Island. It was also obtained in Westland, South Island, by Sir James Hector, nearly thirty years ago; and I observed it on the Rangitata River, on the eastern side of the Island, thirteen years ago. But I have not heard of a single capture for many years past. I will here refer to other species formerly inhabiting New Zealand, but now extinct, as I desire to adduce evidence to show that these species were probably ancient inhabitants of the Islands, and not in all cases mere modern accidental introductions by man. A male of *Catopsilia catilla* was taken many years ago in the grounds of St. John's College, Auckland, and is now preserved in the local museum. Several specimens of the beautiful *Diadema nerina* were captured forty years ago, and sent at that time to the British Museum by the late Dr. Sinclair, of Auckland, and others taken and observed by the late Rev. Richard Taylor, of Wanganni, and Dr. Barker, of

Christchurch, New Zealand. Other species occurring in Australia and New Zealand are *Pyrameis stea*, *P. cardui* var. *kershawi*, *Lycæna phœbe* (one specimen only taken), and *Junonia vellida*. Among the Heterocera having a wide distribution occur *Heliothis armigera*, *Agrotis ypsilon*, *Sphinx convolvuli*, *Deiopia pulchella*, &c. The above list is given to show the geographical range and relations of the species, and it appears to me that the question of their distribution must be explained by some more reliable theory than their occasional immigration from Australia, or accidental introduction by other means. For this purpose let us consider the geological aspect of the case.

The Lepidopterous fauna of New Zealand is, with few exceptions, composed of very ancient species, and Mr. Meyrick, who has traced the affinities of the Micro-lepidoptera with a skilful hand, has shown that a few of the same genera, or other closely allied genera and species, are also found in different parts of Australia, Tasmania, Fiji, Europe, Ceylon, Borneo, Hawaiian Islands, and South America. In his Presidential Address to the Philosophical Society of Canterbury, New Zealand, in 1884, Prof. F. W. Hutton pointed out that "New Zealand had not been connected with Australia since the cretaceous period." The same able geologist, in dealing with the origin of our fauna and flora, also pointed out that in early mesozoic times New Zealand, Eastern Australia, and India formed one biological region, land probably extending continuously from New Zealand to New South Wales and Tasmania. Referring to the scarcity of animals occurring in both Australia and New Zealand, Prof. Hutton remarks, "On the whole we may well be astonished that, notwithstanding the strong westerly cyclones and the special facilities afforded by petrels, no animals except a few birds and insects, and but few flowering plants, have been able to cross this very ancient barrier." Mr. A. R. Wallace, in discussing the origin of the New Zealand fauna, admits that there is "a wonderful amount of speciality," and adds that "the affinities, where they can be traced, are with Australia and Polynesia." But the labours of Mr. Meyrick with the Micro-lepidoptera, and Mr. A. G. Butler in other groups, have clearly shown that with few exceptions the Lepidopterous fauna of New Zealand has originated within its present limits or region, and are unquestionably relicts of a very ancient fauna. In the case of the species mentioned as occurring in both countries, they appear to me to afford examples of species retaining their typical colours for an almost indefinite period of time. The same applies to several species of Coleoptera, and birds of feeble flight indigenous to both countries; but we need not here impress the bearing of this question further on the subject.

In regard to the occurrence of the Eastern golden plover in New Zealand, and the latter forming its eastern limit, it seems

to me to afford no support to Mr. Adkin's theory of occasional migratory swarms of insects probably following the annual migration of birds. Although the great geographical range of this bird was recently referred to by Colonel Legge, its annual migration was known to the late Mr. Gould nearly half a century ago, and a very complete history of the species is given in Sharpe and Dresser's 'Birds of Europe.' Sir Walter Buller, the greatest authority on the birds of New Zealand, remarks, "It occurs occasionally on the New Zealand coast, but apparently only as a straggler, and almost always in winter plumage." If such a theory were tenable, it would be more supported by the annual migration to New Zealand of two species of cuckoos, the one from Australia, the other from Polynesia. And other species occur as stragglers, generally at long intervals, but all are endowed with great powers of flight, and no doubt the migratory impulse in birds has been inherited for innumerable ages. The annual migration of birds to the British Islands, and the occasional migration of swarms (or the greater abundance) of certain species of Lepidoptera from the Continent, seem to me to be due in many cases to totally different causes; with birds it is an hereditary impulse acting in obedience to the law of reproduction; with Lepidoptera it may, as Mr. Adkin observes, sometimes affect the status of a species, at least such with wingless females; yet in New Zealand I observe that the occasional abundance of Lepidoptera is due to the law of interdependence of plants and insects operating with greater force in some seasons than others. The imagos of some species of Lepidoptera are dependant on the blossoms of certain plants for their support, the failure of which in some districts (or a scarcity in some seasons of the food-plants of the larvæ) would instinctively impel them to migrate to other districts where such existed, thus causing their numbers to be concentrated within a limited area. The same cause affects frugivorous birds, and in the agricultural districts we have experienced four great irruptions of the native parrakeets within the last twenty years from this cause alone.* In the forest region of Westland some seasons are noted for producing great swarms of insects. In such seasons the insectivorous birds invariably appear in greater numbers in the districts most affected, and roam through the forest in large flights, con-

* The irruptions of Pallas's sand grouse into the British Islands in 1863, and two years ago, is another case in point. If "the occasional migrations of Lepidoptera follow the routes taken by the birds in their annual movements," it would be of considerable interest to know what caused the dearth of insect food, in the preceding year, which compelled the birds to migrate westward. There is a note in last year's volume of the 'Entomologist' (now lent to a friend, and I cannot cite it), calling attention to the occurrence in the British Islands of *Deilephila galii* in unusual numbers in both years in which the birds appeared. Although even in these exceptional cases such occurred, it was in all probability due in both instances to the absence of food in their natural haunts, caused by some seasonal derangement.

suming them. The species of birds that congregate in these districts in certain seasons are generally met with singly, or in pairs; and we have here analogous cases of birds and insects illustrating the law of interdependance of plants and insects, and of birds and insects, together with an elucidation of the causes of the partial or perfect migration of certain species of both forms. In the case of the several species named by Mr. Adkin, with wingless females and their swarms occurring at intervals of several years, it is probable that such are regulated by the same cause; but of British Lepidoptera I do not profess to know anything; there are probably other causes regulating the migratory instinct of which we know little or nothing; yet, this line of research, when carefully pursued, affords a method of working out the causes which regulate the numbers and distribution of certain species. If we consider the great distance between Australia and New Zealand (given in the 'Challenger' expedition at 1200 miles), I doubt if any species occurring in New Zealand could sustain such a flight across the intervening ocean. If *Anosia plexippus* is not an old indigenous inhabitant of New Zealand, it could only have reached the Islands from the east, and in such case the difficulties would be much greater, and certainly I know of no artificial means favouring its dispersion before the year 1840, as very few European settlers had settled in the Islands before that date. If migration from Australia could have any bearing on the occasional abundance of Lepidoptera in New Zealand, we would naturally expect the occurrence also of other strictly Australian species, many of which are powerful fliers, but such has never been observed here; and although I do not fully agree with Mr. Adkin's concluding remarks, I believe I have made it clear that the general abundance of Lepidoptera and other Orders of insects observed last season in New Zealand was not in any way affected by migration, but the effect only of strictly local causes operating under very favourable conditions.

Ashburton, New Zealand, June 20, 1891.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

ENTOMOLOGICAL PINS. — The black-enamelled pin introduced a few years ago, and now so generally adopted, is undoubtedly an advance on the silvered pin previously in use, but our entomological pins are still open to considerable improvement; they should be firmer, and furnished with sharper points. We do not now find so much verdigris in collections of Lepidoptera where black pins are wholly used, and in the few cases where verdigris exhibits itself, the cause is probably due to the fact that the pins with which the affected insects are impaled had a portion of the enamel abraded when they were inserted in the specimens. Users of black pins, the smaller sizes especially, often find that two, or sometimes more, are stuck together.

These should be thrown away at once, as to use them for cabinet specimens of Lepidoptera would almost certainly result in the subsequent distortion of the insects. In pulling apart these "geminated" pins, the enamel would be stripped from one or the other, perhaps both, at the point or points of cohesion, and, as the pins are made of brass, corrosion would be sure to ensue when the abraded portions came in contact with moisture of any kind. Whilst makers continue to fashion our pins of brass they will never succeed in giving entomologists a thoroughly satisfactory pin, *i.e.*, one which is practically incorrodible, will not collapse under moderate pressure, and bearing withal a point capable not only of piercing the thorax of an insect, but of penetrating any substance not harder than deal. Mr. Leech has had a pin made for him in continental sizes (supplied by Watkins and Doncaster) which possesses all these desirable qualities, and there appears to be no valid reason why the same makers should not turn out as good a pin in English sizes.—RICHARD SOUTH.

GYNANDROMORPHOUS ARGYNNIS PAPHIA.—While collecting in the New Forest I captured a very curious variety of *Argynnis paphia*, the wings on the right hand being decided female, while those on the left are decided male, giving the insect a very peculiar appearance.—C. H. WILLIAMS; 7, Carburton Street, Great Portland Street, W., August 19, 1891.

GYNANDROMORPHOUS COLIAS ELECTRA.—Recently I received a small collection of Rhopalocera from the Transvaal, and amongst them there is a singular aberration of *C. electra*. The right side is male, and the left is female; and while the male wings are normal in colour, the female side differs altogether from the type, in being the pale, almost white, variety that corresponds to our var. *helice* of *C. edusa*.—ROBERT SERVICE; Maxwelltown, Dumfries, August 18, 1891.

VARIETY OF VANESSA C-ALBUM.—On the 25th of July last I captured, on the banks of the Wye, near here, a curious variety of *V. c-album*. The specimen is smaller than is usual. Colouring very dark. The right fore wing has the two large spots on the costal margin coalesced, also the two on the inner margin; all much suffused. The left fore wing has the spots distinct, but large and suffused. The hind wings are suffused with deep black at the base, and without distinct spots. I may add that the species is fairly plentiful here this year.—(Rev.) GERARD W. PALMER; The Vicarage, Monmouth. [Our correspondent has very kindly sent us a coloured sketch of this interesting aberration. It appears to be a modification of the form figured, Entom. xxii. pl. viii. fig. 5.—ED.]

XANTHIC VARIETY OF EPINEPHELE IANIRA.—I captured in the New Forest, 21st July last, a beautiful partially bleached (xanthic) form of *E. ianira*, having the right primary of a glistening creamy white blending into pale smoky brown at the base; the ocellus is normal, excepting the black pupil, which is not so deep in colour. It is a male, in the very finest condition; apparently it had not flown before I secured it, as its flight was slow and weak. "Bleached" is hardly a correct term for this particular form of variation, as it is caused by the want of colouring pigment in the scales, which, I should say, is not bleaching. The term *xanthic* or *xanthine*, therefore, would be more appropriate for this constant phase of variation in the Satyridæ.—F. W. FROHAWK; Balham, S.W., August, 1891.

NOTE ON THE EMERGENCE OF NOTODONTA TREPIDA.—Last autumn Mr. Christy, of Watergate, was good enough to send me twenty pupæ of *N. trepida*, and imagines from these have emerged this year in, as it appears to me, a most erratic manner. The first specimen, a female, appeared on May 13th, and was followed by a male on the 20th of the same month. After an interval of twenty-four days, another male came up on the 13th of June. Two males emerged on the 21st of June, and two males and one female on the 23rd closed the list for that month. On July 11th two males appeared, and a female on the 19th. The first female was kept alive for twelve days, but was removed from the breeding-cage on the ninth day, as it was noticed she had commenced laying eggs. When placed in a chip-box, covered with muslin, she deposited a number of ova, but these, together with those previously laid in the breeding-cage, were infertile. The female and two males, which emerged on June 23rd, were allowed to remain in the cage for sixty hours, when the female was placed in a chip-box, wherein she deposited ninety-three eggs; but these, also, proved to be infertile.—RICHARD SOUTH.

NOTES ON ASTHENA LUTEATA.—This is a species I have met with sparingly among maple in many places during the last twenty years. Beating hedges and netting at dusk have been the chief methods of procuring it. This season I discovered that it flies high in the air, some eight feet from the ground, at about half-past eight p.m. Availing myself of this discovery, I succeeded in catching with a long-handled net, on June 24th, no less than twenty-one specimens of *luteata* between half-past eight and nine p.m. One of the females I sleeved out on a maple-bush in my garden, and, on bringing it indoors for examination early in August, I found it contained several larvæ of *luteata*. They are apple-green, showing white between the segments, and are covered with numerous fine hairs. This larva was quite unknown to me before, and I think the majority of entomologists are unacquainted with it. The great advantage of breeding from the egg is that it enables one pretty accurately to hit the time for finding the larva in a state of nature. August is rather a dull time for collecting; so, having nothing better to do, I sallied forth with my umbrella on the afternoon of the 15th, and, as a result of about an hour's beating, I obtained some twenty *luteata* larvæ. They were of all sizes, a few full-fed, but mostly quite small, and very difficult to see in the umbrella. They hang by a silk thread, and are very lively little fellows. I found it paid better to beat separate bushes, rather than the maple forming part of thick compact hedges. The larva pupates in a cocoon formed of silk, and covered on the outside with particles of sand. It remains in the chrysalis state during the winter.—(Rev.) GILBERT H. RAYNOR; Victoria House, Brentwood, August 15, 1891.

ASTHENA BLOMERI IN BUCKINGHAMSHIRE.—On the 8th of August last I took two specimens of this pretty species in a beech wood about six miles from Rickmansworth. They were resting on the trunks of beech trees, and are in good condition.—RICHARD SOUTH.

EARLY PUPATION OF SMERINTHUS POPULI.—When pupa-digging on the 4th of August I took a larva of *S. populi*, which became a pupa on the 9th, this being two months earlier than I have ever taken it before.—D. H. S. STEWART; Red Court, Bedford, August 11, 1891.

COLLECTING IN CAMBRIDGESHIRE AND SUFFOLK.—When I went down to Wicken, on June 3rd, the Fen was still looking brown, and the dead reeds and sedge still overtopped the young growth, and gave the place quite a wintery aspect. Some early moths were still already about, and I took a good many the first night. The weather, for the greater part of the next fortnight, was cold, cold enough for fires and winter clothes. At light, in the Fen, I had but two decent nights, the first and the last, June 3rd and 17th. On June 3rd the night was darkish and fairly warm, but the wind was in the east. The following moths were taken:—*Saturnia carpinii*, 1, a female, quite fresh; *Spilosoma fuliginosa*, commonly; *S. menthastri*, 2 or 3; *Meliana flammea*, several (this species must be taken when it first comes out, as it gets shabby very quickly); *Teniocampa gracilis*, a female, which I saved for eggs (it layed on dwarf willow in a muslin sleeve; the larvæ are now feeding, and seem to me very small, some of them being scarcely $\frac{1}{4}$ of an inch in length, August 4th); also *Coremia ferrugata*, *C. unidentata*, *Cidaria associata*, *Eupithecia vulgata*, and *Nascia ciliatis*, 2, June 17th; *S. fuliginosa*, 2 or 3; *S. menthastri* and *Earias chlorana*, 1; *M. flammea*, several (mostly worn specimens); *Arsilonche venosa*, 2; *Grammesia trilinea*, *Eupithecia centaureata*, *Cabera pusaria*, *N. ciliatis*, several. Sugar was moderately successful on more than one occasion, and produced:—*Noctua rubi*, common and worn; *Gonoptera libatrix*, a few; *Apamea basilinea*, several; *Hadena adusta*, several; *H. genista*, 2 or 3; *H. oleracea*, 2 or 3; *H. suasa*, 1; *Dianthæcia cucubali*, 1; *Teniocampa gracilis*, 2; *T. gothica*, 2; *Acronycta psi*, 2 or 3; *A. megacephala*, 1; *Apamea unanimitis*, common. Of larvæ and pupæ I got the following:—*Lasiocampa quercifolia*, a few found on buckthorn bushes (this larva was to be found up till June 16th, and perhaps later for all I know); *Scotosia vetulata*, on buckthorn; *Plusia festucae*, 2 or 3; *Leucania pudorina*, *L. impura*, and *Triphæna interjecta*, 2 or 3 by sweeping. Heavy dew or rain made sweeping very unpleasant and unproductive, and many of the larvæ were killed in the bag by the weight of the wet calico and the mass of snails that were collected at every sweep. Of *Plusia orichalcea* larvæ I took a few on hemp agrimony, on June 5th. *Callimorpha dominula* larva, 1: this now scarce moth is said to have been very common here many years ago. *Lithosia complana* larvæ, feeding on the lichens on the bark of willow trees; the imagines, which have been lately coming out, nearly all have the under wings pale lead-coloured, not yellow, but the same colour as the fore wings, only much paler. *Geometra papilionaria* larva, 1, on alder. Pupæ of *Trochilium apiformis*, 3, and *S. populi*, 1, by digging at the roots of poplars. *Papilio machaon* was flying when there was enough sun, which was seldom. *Hepialus lupulinus* was common, and I took some very pale-coloured males, almost cream-coloured [see Entom. 197]. *Hydrelia unca* and *Bankia argentula* were also on the wing. From June 18th to 22nd I was at Tuddenham, and the weather was very hot and sunny all the time. *Lithostege griseata* was on the wing, but most of the specimens were worn. *Acidalia rubricata* was very scarce, and I did a great deal of walking and beating of rough grass for it and *Agrophila sulphuralis*. The last-named species was just beginning to come out, and all that I took, some dozen specimens, were in good condition. *A. rubricata* is an extraordinarily sharp flyer for so small a Geometer; it seems to dart off, when disturbed, as quickly as a skipper, and a blazing sun and high wind I found were all against catching them. Sugar was very good. Moths came well on four nights out of five. I took the following:—

G. trilinea, common; *Miana strigilis*, common; *M. fasciuncula*, several; *Rusina tenebrosa*, several; *Agrotis segetum*, several; *A. exclamationis*, 2; *Noctua plecta*, 2 or 3; *L. comma*, 2; *Dipterygia pinastri*, several; *Mamestra anceps*, several; *M. brassicæ*, 1; *M. albicollis*, 3 or 4; *Apamea basilinea*, 3 or 4; *Caradrina morpheus*, common; *Triphæna pronuba*, 3 or 4; *T. subsequa*, several; *Axylia putris*, 2; *Xylophasia rurea*, 3; *X. polyodon*, 1 or 2; *Apamea gemina*, several; *Noctua c-nigrum*, 3 or 4; *Neuria saponaria*, 1; *Hadena genistæ*, 1; one *Chærocampa porcellus*, at rest on a nettle, about 10.45 p.m.; and one *S. tilia*.—W. M. CHRISTY; Watergate, Hants.

COLLECTING IN SOUTH WALES.—I came down into South Wales on the third week in June, and for some days found the weather most favourable for Lepidoptera. Of the Diurni, in June, *Argynnis selene*, *Lycæna icarus*, and *Hesperia sylvanus* were plentiful; so late as June 23rd *Euchloë cardamines* was on the wing; and at the same date *Argynnis aglaia* was just emerging. On favourable evenings, damp and windy ones I generally find the best, the commoner species of Lepidoptera came plentifully to sugar, such as *Agrotis exclamationis*, *Noctua festiva*, *Miana strigilis* var. *latruncula*, *Apamea gemina*, *A. unanimitis*, *Xylophasia monoglypha* (*polyodon*), *X. lithoxylea*, *X. rurea*, and others. On the 27th, *Phlogophora meticulosa* appeared with *Leucania impura*, *L. pallens*, and *Axylia putris*; and *Noctua rubi* was still out. *Thyatira batis* was still on the wing on July 6th, *T. derasa* on the 11th (would not this be too early for the second brood?). The whole month of July was a complete change to that of June as regards sugaring, on several evenings scarcely a single specimen appearing. In Pembrokeshire, on July 17th, near the sea-coast I saw *Thecla rubi*, *Vanessa urticæ*, one specimen of *V. atalanta*, *Argynnis paphia*, and *Bombyx quercus* dashing about in its usual headlong flight. At the present time both *Pieris rapæ* and *P. napi* are very abundant, in some places quite in swarms. I think the scarcity of Lepidoptera at sugar during July may have been due to the quantity of natural food at that time, as the blossom of grasses, rush, &c.; but certainly many evenings were not favourable. I might add that the Geometræ, generally, have been common.—T. B. JEFFERYS; Carmarthenshire.

COLLECTING IN NORTH WALES.—I spent the month of July at Penmaenmawr (on the north coast of Wales), and though, as a whole, the district does not seem to be very productive in Lepidoptera, the quality amply makes up for this deficiency. My wanderings led me one day up among the crags on the mountain tops, and here I found *Agrotis lucerneæ*, flying over a patch of shale in great numbers. They were bad to get, owing to their rapid flight and the loose foothold; but I managed to get upwards of twenty beautiful specimens in a few days. When I had had enough of *lucerneæ*, I took to searching the cliffs for any unwary moth that might be there, and to my great delight discovered, first *Agrotis ashworthii*, and then *Acidalia contiguaria*. Of the former I took eight in fine condition, and two more not so good; and of the latter I took eight also, all in very fair order. I was the more pleased at getting these two things as I did not know at the time that they were to be got in the neighbourhood. There were sundry other things sitting about on the rocks, viz., *Bryophila perla*, *Gnophos obscurata*, *Larentia cæsiata*, *Anaitis plagiata*, &c.; but after *ashworthii* and *contiguaria* these did not come in for much attention. I also took several

batches of *Noctuæ* ova, the larvæ from which are now feeding well on willow. From what descriptions I can obtain of the young larvæ, I should say they are *ashworthii*, but cannot make sure yet. — L. S. BRADY; Mowbray Villas, Sunderland, August, 1891.

NOTES FROM THE NEW FOREST.—On July 20th I went down to Lyndhurst, accompanied by a college friend, Mr. E. B. Charles. The night of our arrival was too wet for outdoor work, but we made a beginning by taking a fine specimen of *Geometra vernaria*, which flew into the billiard-room of the "Crown Hotel." The next day was fine, but dull, and a stiff breeze was blowing. We got to work early in the neighbourhood of Hurst Hill. *Epinephle hyperanthes* and *E. ianira* were the first insects to put in an appearance, the latter showing occasional bleached forms. *Pararge ægeria* and *Epinephle tithonus*, though less common, were also seen, as well as a few worn *Argynnis selene*. As usual, *A. paphia* was present in myriads. On the heaths we met with very fine *Eubolia palumbaria*, *Pseudoterpna cytisaria*, and *Lycæna ægon*. *Argynnis adippe* was also in evidence, but was by no means common; and a few *Hesperia sylvanus* turned up. We got a pretty form of *Boarmia repandata*; and, towards noon, a noble specimen of *B. roboraria* fell to my companion. One *Limenitis sibylla* was seen, but managed to make good its escape. After luncheon we turned back to Lyndhurst, and, armed with a fresh supply of pins and boxes, made our way across the heath to the railway station. In an enclosure, close to the line, we found *Melanargia galatea* literally swarming; and also took *Pyrausta purpuralis*, *Phytometra ænea*, *Argynnis adippe*, *Ellopiæ fasciaria*, and a solitary *Zygæna trifolii*. In the evening we tried sugaring in Hollands Wood. This expedition had no result, entomologically speaking; but the dull futility of our visits to the trees was presently relieved by an incident which, while it furnished a little extraneous excitement, very nearly ended our career as collectors, and brought our operations for that night to an untimely end. Our lamp blew up, and, after a gorgeous pyrotechnic display, left us helpless in the dark. There was nothing for it but to abandon the sugar and return to our hotel, which we accordingly did. The weather on July 22nd was again dull and windy, with the addition of a few heavy showers at mid-day. We took, however, *Limenitis sibylla*, and one each of *Gonopteryx rhamni*, *Gnophos obscurata*, *Calligenia miniata*, and *Selidosema plumaria*. Some very fine *Satyrus semele* and *Hesperia thaumas* were also captured. Our evening's sugaring, undertaken for the benefit of *Catocala promissa*, was a dead failure; and the same may be said of a gigantic lighthouse which we erected in Hurst Hill Enclosure. However, at dusk we netted *Pseudoterpna cytisaria* and *Hemithea thymiararia*. On the 23rd we took a new direction, and started early for Brockenhurst through the woods. As we worked our way along we took *Limenitis sibylla* by the score, but only the females were in good condition. The sun was hidden nearly all day behind a thick bank of clouds, but, notwithstanding, *Argynnis paphia* was to be seen in hundreds resting motionless on the bracken and brambles. An occasional *valezina* appeared, and we took three, of which two were very fine. *Eubolia mensuraria*, *Pyrausta purpuralis*, *Hesperia thaumas*, and *H. sylvanus* were very abundant. On reaching Brockenhurst we took train for Lyndhurst Road, and half an hour later were again enjoying good sport among *Melanargia galatea*, *Phytometra ænea*, and *Limenitis sibylla*. We also saw *Thecla quercus* and *Lomaspilis marginata*. The sugar and lighthouse in the

evening fully maintained their reputation for futility, but we netted *Calligenia miniata* and *Lithosia mesomella*. On the next day (our last in the Forest) we had excellent sport on the same ground, taking many *valezina*, of which, however, several were torn and worthless; five grand specimens (four taken by Mr. Charles) represented our morning's work with this insect. In the afternoon we worked Lyndhurst Common for *Selidosema plumaria* and *Gnophos obscurata*. The latter failed to turn up; but *plumaria*, though not common, was in splendid condition. The same remark applies to *Satyrus semele* and *Pseudoterpna cytisaria*. We also took *Bupalus piniaria* (which, somewhat to my astonishment, was also in fine condition) and one more *Calligenia miniata*. We left next morning. Had the weather been a little more favourable, we should, no doubt, have added largely to our bag, as insects, though late, were plentiful and in good variety.—E. G. ALDERSON; Worksop, Notts.

LATE APPEARANCE OF *AGROTIS ASHWORTHII*.—My own general experience, in common with that of correspondents, shows the lateness of the season. Taking *Agrotis ashworthii*, for example, I find my first bred specimen in 1889 emerged on June 27th, in 1890 on June 23rd, and this year (1891) on July 12th—all bred on the same spot. An attempt this season to obtain eggs met with a fair amount of success. I fed the moths on fresh blossoms of the lime tree.—J. ARKLE; July 18, 1891.

LITHOSIA QUADRA AT KING'S CROSS.—On July 20th I had the pleasure of taking a fine female of *L. quadra*, at rest, in the York Road, King's Cross, N.W.—S. ROBINSON; Winchmore Hill, N., August 24, 1891. [Probably this and the specimen recorded *ante*, p. 196, were escapes.—ED.]

NOLA CENTONALIS, &C., IN THE HASTINGS DISTRICT.—On July 15th I took a fine specimen of *N. centonalis**, flying at dusk on the cliffs near the town; and at the same locality I have taken *Sesia ichneumoniformis** (1), *Acidalia osseata* (common), *Stenia punctalis*, *Platytes cerussellus*, *Homæosoma sinuella*, *Conchylis francillana**, *Platyptilia gonodactyla* (all somewhat common), *Ceratophora rufescens*, &c. Those I have marked with an asterisk are new to our district.—A. FORD; Claremont House, Upper Tower Road, St. Leonards-on-Sea.

PLUSIA BRACTEA IN WORCESTERSHIRE.—Collecting near Bewdley, with my friends Messrs. E. and H. Tye, of Birmingham, on the 26th July last, I took a fine freshly-emerged specimen of *Plusia bractea*. It was flying among the herbage on a railway-bank, and, on settling, was easily captured.—GEORGE W. WYNN; 192, Lozell's Road, Handsworth, Birmingham, July 28, 1891.

A DAY AT TUDDENHAM IN SUFFOLK.—I went over to Tuddenham from Bury St. Edmunds, on the 13th of August last, to look for larvæ of *Dianthæcia irregularis*, but was disappointed to find that all the *Silene* capsules had been cleared off. There were several *Epinephele tithonus* flying about; and beating the hedgerows disturbed sundry specimens of *Acidalia bisetata*, *Coremia ferrugata*, *C. unidentaria*, and *C. quadrifasciaria*. A few of each were good enough to box. Altogether the excursion was not an entomological success.—RICHARD SOUTH.

CHÆROCAMPA NERII IN BRITAIN.—The following record should be added to the list given, *ante* p. 195. 'Entomologist,' xvii. 273, one imago, Blandford, Dorset, 1884.—R. S.

CAPTURES AT ELECTRIC LIGHT.—Acting on the advice given by the Editor in Entom. 172, *re* the working of electric light, I paid a visit to the lighthouse now open at Chelsea, on the 15th of July, where I managed to capture specimens of the following; they were mostly rather battered:—*Leucania conigera*, *L. lithargyria*, *L. impura*, *L. pallens*, *Hadena oleracea*, *H. dentina*, *H. chenopodii*, *Agrotis corticea* *A. nigricans*, *Xylophasia polyodon*, *X. rurea*, *Cucullia umbratica*, *Phlogophora meticulosa*, *Tryphana subsequa*, *T. orbona*, *T. pronuba*, *Cossus ligniperda*, *Zeuzera æsculi*, and *Chelonia caia*. Had the night been warmer and less windy the list might have been much larger, as on many nights moths have been very abundant, so the director of the light told me.—D. H. S. STEWART; Royal College of Science, Kensington, W., July 27, 1891.

A NEW SETTING-BOARD.—Messrs. Day and Newstead have recently introduced a new style of setting-board, which should prove most useful to those who experience difficulty in setting insects to their satisfaction on the ordinary board. By an ingenious arrangement of hinged flaps or slips of glass, the operator can, by means of this improved “set,” manipulate his insects expeditiously and with precision.—RICHARD SOUTH.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON. — *August 5th*, 1891. — Mr. Frederick Du Cane Godman, M.A., F.R.S., President, in the chair. Mr. Arthur J. Chitty, of 33, Queen's Gate Gardens, S.W., and Captain E. G. Watson, of 5, Lypiatt Terrace, Cheltenham, were elected Fellows of the Society. The President announced the death of Mr. Ferdinand Grut, the Hon. Librarian of the Society, and commented on the valuable services which the deceased gentleman had rendered the Society for many years past. Dr. D. Sharp exhibited *Japyx solifugus*, from the Eastern Pyrenees, and stated that in his opinion it was a connecting link between the *Thysanura* and *Dermaptera*. He also exhibited pupæ of *Dytiscus marginalis*; one of these was perfectly developed, with the exception that it retained the larval head: this was owing to the larva having received a sight injury to the head. Dr. Sharp also exhibited specimens of *Ophonus puncticollis* and allied species, and said that Thomson's characters of the three Swedish species, *O. puncticollis*, *O. brevicollis*, and *O. rectangulus*, applied well to our British examples, and separated them in a satisfactory manner. Thomson's nomenclature, however, would, he thought, prove untenable, as the distinguished Swede described our common *puncticollis* as a new species, under the name of *rectangulus*. Mr. F. W. Frohawk exhibited a bleached specimen of *Epinephele ianira*, having the right fore wing of a creamy white, blending into pale smoky brown at the base; also a long and varied series of *Epinephele hyperanthus*, from the New Forest and Dorking. The specimens from the former locality were considerably darker and more strongly marked than those from the chalk. Amongst the specimens was a variety of the female, with large lanceolate markings on the under side, taken in the New Forest in July, 1890, and a female from Dorking, with large, clearly defined white-pupilled spots on the upper side. Mr. Frohawk further exhibited drawings of varieties of the pupæ of *E. hyperanthus*, and

also a large specimen of a variety of the female of *Euchloë cardamines*, bred from ova obtained in South Cork, with the hind wings of an ochreous yellow. Coloured drawings, illustrating the life-history of the specimen in all its stages, were exhibited. Mons. Sergé Alphéraky communicated a paper entitled "On some cases of Dimorphism and Polymorphism among Palæarctic Lepidoptera."—H. Goss, *Hon. Sec.*

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—*July 23rd, 1891.*—The President in the chair. Mr. Turner exhibited specimens of *Bupalus piniaria*, L., from Westerham, among which were pale examples of the female. Mr. Hawes, living pupæ of *Pararge megæra*, L., on *Poa annua*, and stated that out of a brood of five dozen larvæ at least one-fourth of the pupæ were black instead of green, and there was also an intermediate form which was of a dull bice; he could find no record of black pupæ of this species. Mr. C. G. Barrett said it would be interesting to note if the variation was sexual. Mr. Dennis, a very strongly banded form of *Spilosoma lubricipeda*, Esp., and other specimens approaching it, all from his garden at Hackney. Mr. Nussey, bred examples of *Cucullia absinthii*, L. Mr. Waller, bred series of *Aplecta tincta*, Brahm., *Triphæna fimbria*, L., *Eupithecia venosata*, Fb., and *Dianthæcia carpophaga*, Bork., from the Home Counties. With regard to the last-named species, Mr. Barrett made some remarks, and pointed out that one specimen had five wings. Mr. Tugwell, a very fine series of *Zygæna exulans* var. *subochracea*, White, captured at Braemar in 1891; also Swiss examples, to show the great difference between the two forms. Mr. Billups, several species of British Diptera, including *Sapromyza platycephala*, Lew., from Dulwich and Oxshott, Surrey, *Chlorops hypostigma*, Meig. (Dulwich), *Oxycera terminata*, Meig. (Dulwich), *Pipezella annulata*, Mg., one specimen, *Clidogastra punctipes*, Mg., *Oxyphora arnicæ*, L. (all from Oxshott); the first two species, Mr. Billups stated, were not included in Mr. Verrall's list, and the last four were only included in that list as reputed British.

August 13th.—The President in the chair. Mr. J. Jenner Weir exhibited the cases containing living larvæ of *Psyche villosella*, Och. (the produce of the eggs of July in the present year), the cases from which the imagines had emerged, bred from eggs of 1889, and the perfect insects, male and female, and contributed notes thereon. Mr. Weir also exhibited a pair of *Pyrameis degeerii*, Godt., and remarked that it would be seen the male was scarcely, if at all, distinguishable from *Pyrameis cardui*; the female, on the other hand, resembling a faded *P. atalanta*. Mr. Weir made some interesting observations relative to his exhibit. Mr. C. Fenn exhibited a female specimen of *Odonestis potatoria*, L., with male coloration, from Deal. Mr. J. H. Carpenter, a finely marked variety of *Epinephele hyperanthes*, L., the spots on the under side being unusually large and elongated; a bred series of *Melitæa athalia*, Rott., from Essex; and *Cucullia asteris*, Schiff., from Folkestone. Mr. West, *Apamea ophiogramma*, Esp., from his garden at Streatham. Mr. Watson also showed *A. ophiogramma*, and a small bred series of *Ocneria dispar*, L. Mr. C. A. Briggs, *Heliothis peltigera*, Schiff., dark forms from Devon, pale forms from Tuddenham, Suffolk, and Folkestone, Kent, and asked whether both forms had been taken together. Mr. Herbert William, an hermaphrodite specimen of *Pieris rapæ*, L., taken at Box Hill. Mr. Frohawk, a fine series of unusually large females of *Euchloë cardamines*, L., from Kent. Mr. Tugwell, *Nephopteryx abietella*, Zinck., bred from Scotch fir-shoots; also dark varieties

of *Pyrallis farinalis*, L., and a streaked variety of *Botys urticalis*, Schiff. Mr. Hawes, living larvæ of *Syrichthus malvæ*, L., and *Nisoniades tages*, L. —H. W. BARKER, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—*July 20th, 1891.*—Mr. R. C. Bradley in the chair. Mr. G. H. Verrall, F.E.S., was present, and delivered a lecture on "Diptera." He said he had come down with the hope of inducing members to take up the study of the group, which possessed many recommendations not possessed by the other orders of insects. It is almost unworked, so much so that all workers are bound to be able to do some original work. Unlike Lepidoptera and other well-worked orders, which hardly ever receive an addition to the British list, the Diptera can be added to extensively, and he had added some hundreds of species already. Another recommendation to the group is that it is not necessary to go far for fresh material to work at; in his own garden, at Newmarket, he had taken 500 species. He briefly described the classification and characters of the orders, and then took the various families in review, describing all their salient points, and giving many interesting particulars about them. Mr. C. J. Wainwright proposed a vote of thanks, which was seconded by Mr. C. H. Kenrick, supported by Dr. Mason, and replied to by Mr. Verrall.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

OBITUARY.

With deep regret we recorded, in our last number, the death of Mr. FERDINAND GRUT, F.L.S., the Honorary Librarian of the Entomological Society of London. Mr. Grut was elected a Fellow of the Linnean Society on 1st February, 1872, but his connection with the Entomological Society was much earlier, he having been elected in 1846; and, after having served on the Council, was chosen as one of the Secretaries on 23rd January, 1871, and worthily filled that office until 16th January, 1878, when he undertook the duties of Honorary Librarian. To say that he efficiently performed the duties of that office up to the time of his lamented decease, would but feebly convey the value of his services to the Society. Mr. Grut was almost every Wednesday in the library, and was engaged for years in preparing a complete catalogue of the books. This he had finished; and it was with hope that he looked forward to the period when it would be printed for the use of the Fellows. The Society could not indeed pay a more graceful tribute to his memory than at once to take steps to have the Grut catalogue published. Mr. Grut was one of those excellent men who did good, one might say, by stealth, and would have gladly avoided the warm recognition of his valuable services, which at each annual meeting was so enthusiastically given by the Fellows of the Society. Mr. Grut was for many years engaged in the study of the Geodephaga, of which he possessed a very valuable collection. By the death of Mr. Grut, on 19th July, at the age of 71, the Entomological Society of London sustains an almost irreparable loss. It is improbable that a successor, in the office of Honorary Librarian, could be found who would devote so large a portion of time as one day each week to the duties of that position. All who knew Mr. Grut will regret to lose a kind-hearted and courteous man, of singularly equable and amiable disposition.—J. J. W.

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ON *PYRAMEIS DEJEANII*.*

By J. JENNER WEIR, F.L.S., F.Z.S., &c.

THE male of this insect is scarcely, if at all, distinguishable from *Pyrameis cardui*; the female, on the other hand, resembles a faded *P. atalanta*, the red band on the fore wings of the latter species being replaced in *P. dejeanii* by a creamy white one, and the submarginal red of the lower wings in *P. atalanta* becomes subdued in *P. dejeanii* to a dull brown, and the spots of black are far more developed in size, but not quite so dark.

That there should be so marked a difference between the sexes in this insect is the more remarkable, because in the rest of the species of the genus *Pyrameis* the difference between the coloration of the sexes is very slight. In *P. itea*, *P. hippomene*, *P. callirhoe*, *P. cardui*, *P. kershawii*, *P. virginensis*, it is inappreciable, and in *P. atalanta* it consists in the female having a white spot in the red band of the upper wings, which is absent in the male, at least this is generally the case.

P. dejeanii is found, I believe, in the island of Java only; and when, some years ago, I obtained a large number of butterflies from thence, I was struck by the dull appearance of them; a certain duskiess or, as I should term it, phæism seemed to be characteristic of many species which had far more brilliantly coloured allies both in Sumatra and the Asiatic continent; for instance, the dusky-coloured *Salatura intensa* of Java, as compared with the brightly-coloured *S. sumatrana* of Sumatra, *S. intermedia* of the Malay Peninsula, the typical *S. genutia* of continental India, and the white ground colour of *S. edmondii* of the Philippines.

So also the *Salatura melanippus* of Java, its very name suggesting its phæism, as compared with the brightly-coloured

* Abstract of a paper read before the South London Entomological and Natural History Society, Aug. 13th, 1891.

S. hegisippus of Sumatra and Burma, and the Bornean *S. lotis* with the ground colour of the wings white.

Java lies under the equator, and one would have expected to find its butterflies brilliantly coloured; but there must be some cause which produces the phæism adverted to. The only suggestion which has occurred to my mind, and it is purely hypothetical, is whether there is any connexion between this duskiness of the insects and the murkiness of the atmosphere, the result of the irruption of its numerous active volcanoes.

NOTES ON THE LIFE-HISTORY OF *PSYCHE* *VILLOSELLA*.*

By J. JENNER WEIR, F.L.S., &c.

THE males of *P. villosella* emerge from the cases about the latter end of June or during July, leaving the empty pupa skin projecting from the case about one-third of an inch; the female in most instances does not leave the case, but clears the emergent end by pressing herself out about a quarter of an inch; the male appears to be able to fertilize the female by forcing his body into the case, and thus reaching the female. The abdomen is singularly extensile, increasing to more than double its length at emergence.

The female, after fertilization, withdraws herself within the case, and deposits her eggs at the bottom of the old pupa skin, where they remain until the young are hatched. I could not ascertain how many days the eggs remained before the young appeared, but should think about ten or twelve, probably varying somewhat according to the heat of the weather. The old pupa skin remains in the case after the appearance of the young, but I could not find any trace of the skin of the female imago, and I am inclined to think that it is eaten by the young larvæ. From some of mine the young swarmed out of the case at the emergent end, which, I may here remark, is the reverse of the feeding end. Others I cut open, and released the young; they were at once very active, and moved quickly about, their bodies held at an angle of 45°. I could not see that they used any prolegs; locomotion was effected entirely by their true legs. They at once began to make themselves cases, and in three or four hours were all furnished with clothing; for this purpose I supplied them with fine strips of heath and small pieces of moss. Although generally found on heath, they seem in their earlier stages to prefer more succulent food, such as bramble, strawberry, white-thorn, and sloe.

* Abstract of a paper read before the S. L. E. and N. H. S., Aug. 13th, 1891.

During the whole of last winter I had some fifty larvæ, collected in 1890, the produce of the eggs of 1889, feeding on my lawn, under a large framework covered with net in the usual manner. They were quite unaffected by the severity of the winter, and almost all survived till the spring; but it is a singular fact, that although they had been protected from enemies for more than a year, yet many of them produced ichneumons, which must have lived in their hosts since July, 1890, at least.

The females, if removed from the cases, are the most helpless imagines I ever saw, far more so than *Psyche nitidella*; they have neither eyes, mouth, antennæ, legs, or wings, and merely wriggle very slightly, and continually make an annular constriction of their bodies, which slowly passes down from the head to the extremity of the abdomen.

Although in this country there are several species of Heterocera in which the female is apterous, yet in all these instances the legs are developed, and some traces of the wings, except in *Psyche*, are found. In no case is an apterous male known; but I saw, nearly fifty years ago, a moth taken by Mr. Darwin in Kerguelen's Island, which was apterous in both sexes.

NOTES ON BUTTERFLIES FROM THE APENNINES.

BY FRANK B. NORRIS.

THE situation of Boscolungo, or Abetone, as it is sometimes called, among pine and beech forests, at the summit of the pass, between Lucca and Modena, is most beautiful. Mountains rise innumerable in all directions. Cimone, the highest of all, 7200 ft., affords a magnificent view, the Adriatic and Mediterranean being both visible in clear weather, and occasionally the Alps, 250 miles away. For botanists, such varieties as *Epipogon aphyllus*, Sw. (the scarcest of European Orchidaceæ), *Globularia incanescens*, Viv., *Geranium argenteum*, *Leontodon anomalus*, Ball, *Bromus serotina*, &c., are easily found. The hotels are excellent and well managed, and there is an entire absence of the rush and noise, so irksome to many, that is unfortunately too common in Switzerland. The climate, I may add, is magnificent, cool and bracing during the hot months, and one can sleep with open windows at the present time. The following species of Rhopalocera were captured between July 4th and September 4th of this year:—

Parnassius apollo, L.; common on higher slopes until time of writing. *P. mnemosyne*, L.; taken by an acquaintance, July 24th.

Aporia crategi, L.; common. *Pieris brassicæ*, L., *P. rapæ*, L., *P. daplidice*, L.; all common.

Euchloë belia, F.; occurs sparingly on summits. *Leucophasia sinapis*, L., and varieties; common. *Colias edusa*, F., common up to date. *C. hyale*, L.; less common.

Gonepteryx rhamni, L.; fairly common, July.

Thecla ilicis, E.; locally common.

Polyommatus virgaureæ, L.; swarmed during July and August (females varied much in depth of black markings). *P. alciphron*, Rott., var. *gordius*, E.; abundant. *P. dorilis*, Rott.; very uncommon, July. *P. phlæas*, L.; rather common.

Lycæna telicanus, Hb.; one specimen at an altitude of 6000 ft., end of August. *L. ægon*, Schiff.; exceedingly abundant. *L. astrarche*, Berg.; common. *L. icarus*, Rott., *L. escheri*, Hb.; both abundant. *L. amandus*, Hb.; fairly common, July. *L. bellargus*, Rott.; rather rare. *L. corydon*, Poda.; very common. *L. meleager*, E.; very local, and the females especially difficult to find; altitude 3500 ft.; began appearing latter half of July and through August. *L. argiolus*, L.; rather scarce, July. *L. sebrus*, Bdv.; very scarce and local. *L. semiargus*, Rott.; more common. *L. minimus*, Fuessly; local, but numerous. *L. arion*, L.; scarce in July. *L. alcon*, F.; abundant, but very local.

Vanessa c-album, L., *V. polychloros*, L., *V. urticæ*, L., *V. antiopa*, L., *V. atalanta*, L., *V. cardui*, L.; all common. *V. io*, L.; very seldom seen. *Melitæa athalia*, Rott.; abundant.

Argynnis paphia, L., *A. adippe*, L., and var. *cleodoxa*, O., *A. aglaia*, L.; all common. One specimen of *aglaia* taken in July has a great deal of black marking of a most unusual character; on upper surface, and below on hind wings, there is a great suppression of silver markings, those in the centre being confined to three small round spots, those near body larger than usual, and the row of marginal silver lunules almost invisible. The lower wings show a beautiful green effusion of two or three shades on under surface. *A. niobe*, L.; on highest mountains. *A. latonia*, L.; common. *A. euphrosyne*, L.; nearly over in July. *A. daphne*, Schiff.; common in valleys running down from Boscolungo, July and August.

Melanargia galathea, L.; common, but smaller than at Bagni di Lucca.

Erebia epiphron, Kn.; common locally; var. *cassiope*, F., less common. *E. medusa*, Hb.; common; var. *psodea*, Hb., local. *E. lappona*, E.; rather scarce. *E. tyndarus*, E.; common on heights. *E. goante*, E.; common, July and end of August. *E. æthiops*, E.; on summits, August; *E. ligea*, L.; common in woods. *E. euryale*, E.; abundant on mountains; the markings on under side varied much.

Satyrus alcyone, Schiff.; July, August, September, abundant in valleys. *S. circe*, F.; rather scarce, August.

Pararge mæra, L.; common locally, July and end of August. *P. megæra*, L.; scarce, July. *P. egeria*, L.; uncommon.

Epinephle ianira, L., and var. *hispulla*; common.

Cænonympha pamphilus, L.; abundant. *C. arcania*, L.; very common.

Spilothyrus alceæ, E.; scarce, August.

Syrichthus malvæ, L.; here and there.

Nisoniades tages, L.; common.

Hesperia thamas, E., *H. lineola*, O., *H. actæon*, E., *H. sylvanus*, E., *H. comma*, L., and var. *catena*, Stgr.; abundant,

At Bagni di Lucca, three or four hours' drive below this, I found in June, besides many of the above, also :—

Spilothyrus lavateræ, E.; common on stony slopes.

Syrichthus orbifer, Hb.

Melitæa didyma, O.; in Serchio valley. *S. phæbe*, Kn.; scarce.

Limenitis camilla, F.; common.

Apatura ilia, aberr. *clytie*, Hb.; over poplars in Serchio valley.

Vanessa egea, Cr.; abundant in sheltered places.

Hôtel de Florence, Viareggio, Sept. 6th, 1891.

THE COLOURS OF INSECTS.

By T. D. A. COCKERELL, F.Z.S.

MR. COSTE's notes on the colour-variation of Lepidoptera (Entom. 186—192) are very interesting, and would be still more so if they were supplemented by anything like a complete account of the recorded varieties or aberrations belonging to the classes he mentions. I am too busy with other matters now to attempt to prepare any such account, but cannot refrain from making a few scattered observations.

(1). There can be little doubt that changed conditions lead to variability; thus, there is great variability among animals bred in confinement; and again, species imported into new countries (*e.g.*, European species into New Zealand and North America) show much variation. I have lately been collecting notes under this head, and may some day publish details. It is hardly necessary to remark that Darwin has given an admirable and detailed discussion of this subject in his 'Variation of Animals and Plants under Domestication.'

(2). As to blue varieties (p. 190), see Entom. xxii. 127. The Acrididæ show, I think, a blue pigment, which varies to red and perhaps also to green. With *Catocala* the case is hardly so clear. *Sesia* (*Ægeria*) has the bands on the body sometimes yellow, sometimes red, and I have found a new species,* in Colorado, in which they are white and blue. Mr. Jenner Weir showed me Danaine butterflies of the genus *Tirumala* in which the white marking is becoming blue, but this is a physical colour, remaining, as he told me, after the insect had been treated by the "Water-house process."

* *Ægeria*, new species.—Smallish; wings orange; belts on abdomen white and blue, the first white, the second blue, the third white, the fourth blue, and the fifth and sixth white and blue: near the Beckwith Ranch, Custer Co., Colorado, Sept., at flowers of *Bigelovia*. The type is in the collection of the late Mr. Henry Edwards, who informed me that it was new, and he was intending to describe it. I do not publish the MS. specific name I had given it in my notes, as I have no full description, and the insect is no longer at hand.

(3). Colourless varieties of chestnut species are not *always*, I think, "unhealthy or pathological." Mr. Jenner Weir showed me two remarkable species of butterflies which seem to be noticeable in this connection. *Salatura conspicua*, Butler, from Celebes, has the under-wings brown, with the cell white, in striking contrast; but an allied Philippine Island species has all white on the secondaries in place of brown.

(4). There are, of course, some white varieties of yellow species on record, but, as a rule, this kind of variation is rare. However, the white females of *Colias* are familiar to every entomologist. In *Triphæna comes* there is an aberration (sometimes only on one side) in which the hind wings are pale instead of the usual yellow. This, no doubt, is a case of atavism. Among flowers, white varieties of yellow species are very rare, though they occasionally occur, e. g., in *Eschscholtzia californica* and *Aquilegia chrysantha*.

(5). As to yellow varieties of green species, there are excellent examples among birds. The wild canary, which I have myself seen at Funchal, Madeira, is green,—the domesticated bird being, as everyone knows, bright yellow. *Palæornis torquatus*, an Indian parrot, is typically green, but there is a var. *lutescens*, which is yellow. Both the type and the variety may be seen at the British Museum.

(6). For a red variety of a yellow species (p. 192), see *Arctia villica* var. *fulminans*, mentioned in Entom. xxii. p. 2.

(7). In the case of the variety of *Arge galathea*, mentioned by Mr. Coste on p. 192, was it not the black that gave way to red? That black varies to reddish in some butterflies seems almost certain. In Mr. Jenner Weir's collection I saw *Caduga titya*, Gray, in which the marks on the primaries are black, while those on the secondaries are rusty-brown. Now this species has two mimics, coloured in *exactly* the same way, namely, *Hestina nama*, Dbl., and *Papilio agestor*, Gray. Thus there must have been variability towards black or red, and I suppose it likely that originally black markings varied to the rusty-brown we now see.

From what we know of the power of certain reagents to change the colours of insects, it is evident that "varieties" without a satisfactory history must often be looked upon with suspicion. *Danaïx plexippus* ab. *fumosus* (Hulst)* has the wings sooty-brown instead of bright fulvous. I have seen the type of this form in Mr. Hulst's collection at Brooklyn, and from what he told me there can be no doubt that it is a genuine variety. Yet the very same thing can be produced by artificial means! In the museum of the Institute of Jamaica, I found a specimen just like Mr.

* *Danaïx archippus* var. *fumosus*, Hulst, Entom. Amer., ii. 182. See also Entom. Amer., i. 140 and 159, where evidence is given as to the existence of this form alive, and also as to the production of a similar colour artificially by cyanide.

Hulst's type, and had already labelled it "var. *fumosus*, Hulst," when, suspecting something wrong, I questioned Mr. Bowrey, who obtained it, and he told me at once that it had been changed in the ammonia bottle, and was, when caught, quite an ordinary specimen! It had been put into the cabinet by mistake.

At the British Museum I saw a coloured drawing of a butterfly caught by Capt. C. H. Whitaker at Newcastle, Jamaica, early in 1889. It agrees with *Callidryas sennæ* in all respects, except that it is brilliant scarlet. Here, I must confess, I am inclined to blame the cyanide bottle. We have in the museum here, a specimen of *C. sennæ* marked asymmetrically with scarlet on the secondaries, in such a manner as not to leave the remotest doubt that the marking was produced artificially—though no doubt accidentally.

Institute of Jamaica, Kingston, Jamaica, August 22, 1891.

NOTES ON THE NATURAL HISTORY MUSEUM OF BERGEN.

BY THE REV. F. A. WALKER, D.D., F.E.S.

THE collection of insects belonging to the Natural History Museum at Bergen is arranged in two cabinets of fifteen drawers each. In the first of the said two cabinets may be seen, in addition to other specimens, the general collection of Coleoptera, which was very well arranged and named, by a German entomologist, some years since. The two top drawers of the second cabinet are devoted to the Diurnal Lepidoptera of Norway, and have been well and carefully named, as I was assured, and as far as my own knowledge enables me to testify. But the specimens are in several instances old, faded, and indifferent as regards both condition and setting, and not set uniformly moreover. This state of things was fully admitted by the curator present, who stated that their attention had been chiefly directed to higher forms of Nature, such as mammals and birds, and to other lower forms, to the exclusion of insects. Dr. Brunchorst (such was his name) owned to very little knowledge of insects himself, and said that the entomological curator was absent just then, taking his holiday in the country. At my request he kindly took out a drawer of Neuroptera, which I wished to consult in reference to an *Æschna* I had recently captured, and which on my return home I discovered to be *juncea*. But such few dragonflies as were represented, and which all belonged to the genus *Æschna* or *Libellula*, were only named generically, and not specifically at all. Whether British species or exclusively Norwegian, *Æschna* was the only name given. The

two drawers of butterflies above mentioned contained, in addition to the Norwegian kinds, a few North American and tropical specimens, chiefly of the genera *Melitæa* and *Terias*. Lower down in the same cabinet was a representative collection of other tropical kinds, chiefly Papilionidæ and Morphinæ, but in no way remarkable in respect of extent, condition. or variety. The contents of the first drawer of Norway butterflies were as follows:—

Papilio machaon, *Doritis* (*Parnassius*) *apollo*, *Aporia crataegi*, *Pieris brassicæ*, *P. napi* and var. *bryoniæ*, *P. rapæ*, *Anthocharis cardamines*, *Leucophasia sinapis*, *Colias palæno*, *C. hyalæ*, *C. edusa*, *C. hecla*, *C. nastes*, *Gonepteryx rhamni*, *Zephyrus* (*Thecla*) *quercus*, *Thecla rubi*, *Aphantopus* (*Epinephele*) *hyperanthus*, *Polyommatus virgaureæ*, *P. hippothoë*, *P. phlæas*, *Lycæna argus*, *L. astrarche*, *L. optiletes*, *L. pheretes*, *L. argyra*, *L. icarius*, *L. alexis*, *L. argiolus*, *L. aquila*, *L. minima*.

Many of the above species are only represented by a single specimen, as *Pieris rapæ*, *Colias hyalæ*, *C. hecla*, and *C. nastes*; many, again, by only two, as *Papilio machaon* and *Aphantopus hyperanthus*. One specimen of *C. palæno*, ticketed *Papilio palæno*, would seem to be of ancient date, and another label, *Colias palæno*, has been added underneath. The specimens are not all in regular order in respect of species. After a few intervening insects of other kind or kinds, occurs a white specimen of *C. palæno*, presumably a female; and a little further on two more males. Of no one species, so far as I recollect, were there as many as ten specimens. Of the common Pieridæ *Pieris brassicæ*, and of the large Fritillaries *Argynnis aglaia*, were the most numerously represented; and I should judge them to be the two commonest species of their respective tribes, as *A. aglaia*, occurring sparingly at first, became more numerous as July advanced, whereas *paphia* and *adippe* were not seen at all; and I ordinarily saw two or three specimens of *P. brassicæ* every morning, but only three or four of *P. rapæ* during the whole of my tour. Var. *bryoniæ* of *P. napi*, in the museum, was scarcely as dark as I had previously been led to consider that insect.

The contents of the second drawer of Norway butterflies were as follows:—

Vanessa urticæ, *V. c-album*, *V. antiopa*, *V. atalanta*, *V. cardui*, *Melitæa delia*, *M. artemis*, *M. cinxia*, *M. dictynna*, *M. athalia*, *M. parthenie*. *Argynnis pales*, var. *arsilache* and var. *lapponica*, *A. polaris*, *A. frigga*, *A. thore* var. *borealis*, *A. euphrosyne*, *A. selene*, *A. ino*, *A. lathonia*, *A. aglaia*, *A. niobe*, *A. adippe*, *A. paphia*, *Erebia lappona*, *E. ligea*, *E. disa*, *E. embla*, *Pararge egeria*, *P. megæra*, *E. mæra*, *Epinephele ianira*, *Cænonympha hero*, *C. pamphilus*, *Satyrus semele*, *S. briseis*, *Æneis jutta*, *Æ. bore*, *Æ. norna* (one specimen each of last three species), *Syrichthus malvæ*, *S. andromedæ*, *S. centaureæ*, *Nisoniades* (*Thanaos*) *tages*, *Hesperia lineola*, *H. sylvanus*, *H. comma*, *Cænonympha typhon* (one specimen).

REMARKS ON THE VARIATION OF *ZYGÆNA FILIPENDULÆ*.

By RICHARD SOUTH.

THERE are several forms of *Zygæna filipendulæ* known to entomologists, and it will be convenient to refer to these in the present paper in order corresponding with the amount of divergence from the type.

Var. *a.* (*ochsenheimeri*, Zell.)—Characterised by the more decidedly blue tint of the wings; the sixth spot is intersected by a nervule, and the upper one of central pair is usually smaller than its fellow; the hind wing has a fairly broad border.

This variety was first noticed in Britain by Mr. C. J. Boden, who records it as occurring in the metropolitan district during the month of May. I have taken examples at Folkestone, at the end of July, which have the sixth spot intersected, but the colour does not quite agree with typical *ochsenheimeri*.

Var. *b.*—The two outer spots confluent.

Not an uncommon form at Folkestone and Ventnor, and probably elsewhere.

Var. *c.*—The middle pair of spots confluent.

Less common at Folkestone and Ventnor than var. *b.*

Var. *d.* (*cytisi*, Hübn.)—Each pair of spots confluent, forming transverse bars.

Probably not an uncommon form in some localities; but I have only met with two examples, which were detected among some hundreds of specimens of *Z. filipendulæ* on Folkestone Hill, during the last week of July and the first week of August, 1885.

Var. *e.* (*ramburii*, Ld.)—Spots confluent, as in var. *cytisi*, but they are dull scarlet in colour, as also are the hind wings.

I took a specimen at Folkestone, which agrees in colour with this form, but the central pair of spots are not confluent.

Var. *f.* (*cerinus*, Robson.)—The hind wings and spots on fore wings are yellow instead of red.

This striking variety has occurred at Winchester in some numbers. It has also been found in a chalk-pit, during the first week of July, near Cambridge; and there are records of its capture at Birkenhead, Plymouth, Maidstone, and Finchley. Mr. W. Jagger, of St. Ives, Hunts, bred a specimen of "a splendid orange colour instead of red," and two others "had one under wing red and the other orange" (E. M. M. vi. 117).

Var. *g.* (*mannii*, H.-S.)—Wings thinly scaled; the colour of spots and hind wings darker than usual.

This is an alpine form, and, so far as I know, not represented in Britain. I have specimens from Folkestone, which are very barely scaled, but the spots and hind wings are pale in colour, reminding one of *Z. exulans* var. *subochracea*, White.

Var. *h.*—The basal and middle spots connected by a longitudinal streak of red.

I have seen this form in collections, but do not possess a good example of it. In a Folkestone specimen I have there is a projection from the lower basal spot towards the lower spot of middle pair.

Var. *i.*—All the spots united, forming a flame-like reddish streak.

Stephens mentions this form, but I have not seen an example of it.

Var. *j.* (*chrysanthemi*, Esp.)—The usual crimson of spots and hind wings is replaced by a dark colour, ranging from dark brown to bluish black.

Mr. J. E. Nowers (Entom. xv. 39) records the capture of a specimen of this curious aberration in Wyre Forest, on July 3rd, 1881, and describes it as follows:—"The fore wings are of the usual dark green, the spots being black; the hind wings are black, with a dark green margin. The insect measures 1 inch 2 lines, and the spots are rather small." This specimen is now in the collection of Dr. P. B. Mason; and Mr. H. Goss has a similar one, which he captured at Rhinefield in the New Forest, on the 15th of July, 1890. I am indebted to Mr. Baxter, of St. Anne's, for a modified example of this form. In this specimen, which was bred from pupæ obtained in Lancashire, the spots and hind wings are suffused with dark brown.

In addition to the foregoing varieties, there is a form, generally referred by British entomologists to *Z. filipendulæ*, which has the sixth spot either very small or altogether absent from the upper surface. Some of the examples of this form have the border of hind wings rather broad, and these have been considered as probably hybrids between *filipendulæ* and *trifolii*. It has been observed at or near Pembroke, at Folkestone (E. M. M. xix. 21, 43), and at Marlborough (E. M. M. xxv. 184).

The borders of hind wings are usually narrow, but in some specimens, which are quite typical in other respects, they are quite as broad as in *trifolii*. Sometimes the hind wings have irregular and asymmetrical patches of pale orange. I have several specimens marked in this way, all taken at Folkestone in 1885; one of these has the sixth spot on left fore wing also pale orange, while the corresponding spot on the right wing has only a small patch of pale orange on its upper portion.

With regard to the shape of the wings, I have not, so far, observed much aberration; but I have one specimen in which the fore wings are rounded, as in *Z. exulans*.

Lederer has observed that, in Transcausaria, *Z. filipendulæ* gradually becomes changed into *transalpina*, Hub., and *charon*, Boisd. (two insects generally known under the name of *Z. trifolii* var. *dubia*, Staud.), but Christoph would appear to hold the opinion that *dubia*, Staud., and also *stoechadis*, Bork., are southern

alpine forms of *lonicerae*. It would seem, then, that the true position of *dubia*, Staud., is not definitely determined at present; it may be either a form of *trifolii* or of *lonicerae*, but, at the same time, it is connected by intermediate links with *filipendulae*. It is larger than typical *trifolii*, has either five or six spots, and the hind wings are broadly bordered with black. Our five-spotted *filipendulae* appears to fit in here; and is, I think, really referable to *dubia*, Staud.

ON NEW BRITISH DIPTERA.

BY G. H. VERRALL, F.E.S.

WRITING in the 'Entomologist' last year (Entom. xxiii. 154) concerning British Diptera, I said, "A vast amount of work remains yet to be done, but it had better be done with caution."

I was very much interested in Mr. Billups' account of the Entomology of Oxshott in your last number (Entom. 201—204); but before incorporating any fresh species into the list of British Diptera, I preferred to act upon my own observations, and consequently wrote at once to Mr. Billups to ask if he would kindly let me see the more interesting specimens. I am very much obliged to him for placing them in my hands the next day, but I am sorry to say that the result has confirmed me in my decision to act upon my own observations.

Oxycera terminata, Mg.—I believe Mr. Dale's specimens of this species will confirm it as British; but all three of Mr. Billups' are *Pachygaster leachii*, Curt.

Pipunculus geniculatus, Mg.—I believe I possess this, and about fifteen more species of unrecorded *Pipunculi*; but until they are more carefully studied and described, mere names are useless.

Pipizella annulata, Mcq.—Mr. Billups' specimen is a female of the not uncommon *P. flavitarsis*, Mg. (= *biguttata*, Curt.). *P. annulata* may be a synonym, but is a very doubtful species.

Clidogastra punctipes, Mg.—I do not know enough about the Cordyluridæ to name a species with certainty, but I confidently say that Mr. Billups' specimens do not even belong to the genus *Clidogastra*.

Oxyphora arnicæ, Fln.—Is rightly named; but Fallen's *arnicæ* is only a synonym of the very common *O. miliaria*, Schrk. (= *flava*, Geoff.). *T. arnicæ*, L., is a widely different species. Loew, in his latest writings, merged *Oxyphora* and *Oxyyna* in *Tephritis*.

Sapromyza platycephala, Lw.—I have already written of this as an almost impossible British species; but beyond that, my small knowledge of this group suffices to state with certainty that Mr. Billups' specimens do not belong to the family Sapromyzidæ!

Chlorops hypostigma.—I might have had considerable trouble in saying that this was not a specimen of the much debated *C. hypostigma*, Mg., but for the fact that the specimen does not belong to the Chloropidæ!

I would also repeat that *Pteropæcila lamed* is not yet properly recorded from Britain; our species is the little known *Toxoneura muliebris*, Har. (= *fasciata*, Mcq.).

As to misprints, near the bottom of page 203, for *Chrysophilus* read *Chrysopilus*, for *cylindricator* read *cylindrica*, and for *baumhauerri* read *baumhaueri*.

Many of Mr. Billups' captures at Oxshott are quite good enough to prove that the locality is a good one; and, from a specimen in front of me, I see that he caught an unrecorded British species there on August 16th, 1890, in *Sciomyza dubia*, Fln., a well-marked species of which I find I took a single specimen at Lynton on June 17th, 1883.

Let me repeat, "A vast amount of work remains yet to be done, but it had better be done with caution."

(I am extremely obliged to Mr. Verrall for his goodness in putting me straight in this matter of supposed new British Diptera; but, as I have previously stated, I am indebted to Dr. Meade for determining five of the species referred to by Mr. Verrall; the remaining three were identified by Mr. Brunetti.—T. R. B.)

NOTES ON THE PHYTOPHAGOUS GENUS *DIACANTHA*, CHEV.

(COLEOPTERA, GALERUCINÆ.)

BY MARTIN JACOBY, F.E.S.

To my remarks (Entom. Suppl. p. 39) on the genus *Diacantha* (*Idacantha*, Fairm.), saying that M. Allard has created some confusion in regard to this genus and *Aulacophora* in not having recognised the distinguishing characters of both genera, and redescribing some old species by giving wrong descriptions of them, M. Allard has replied that I am totally mistaken, and giving his reasons for it. Further researches on the subject, in which Mr. Gahan, of the Entomological Department of the Natural History Museum, has kindly assisted me, seem to prove that my former remarks are only partially justified, which I am very pleased to own. The reason why I uttered them is as follows:—

Chevrolat first characterised the genus *Diacantha*, but in an unsatisfactory way, including several species in the genus which are not members of it as now understood. Chapuis, later on, described at length the genus in his 'Genera des Coleoptères,' giving the claws as bifid. Still later, von Harold, in the

'Coleopterologische Hefte,' in describing some new species of *Diacantha*, said that Chapuis was mistaken in describing the claws as "bifid;" *D. bidentata*, Fabr., which should be looked upon as the type, having appendiculate claws. I consequently followed von Harold, and excluded all species with bifid claws from *Diacantha*. In this I am, however, as well as von Harold, wrong, for the reason that, although *D. bidentata* is the oldest described species, it cannot be looked upon as the type, not being one of those mentioned by Chevrolat; and that Chapuis's diagnosis, giving the claws as bifid, must be accepted; while *Hypercantha*, Chap., will serve for the reception of species having the four posterior tibiæ mucronate, and possessing appendiculate claws.

My other remarks in regard to M. Allard's arrangements are, however, I think, justified. In his 'Synopsis of the Galerucinæ with a transverse thoracic groove,' the descriptions of *D. picea*, Fabr., and *D. chevrolatii*, Guér., are wrong and misleading. Of *D. picea* a type specimen, from the Hope Museum, is contained in the National Collection. This species has, however, nothing to do with *Diacantha*, but is identical with *Stenoplatys pascoi*, Baly.

In justice to M. Allard I thought this explanation necessary.

7, Hemstall Road, W. Hampstead.

NOTES ON THE SYNONYMY OF NOCTUID MOTHS.

BY ARTHUR G. BUTLER, F.L.S., F.Z.S., &c.

THE present paper was sent to the Entomological Society of London in continuation of articles already published in their 'Transactions' upon the same subject. It was read at a meeting held the 3rd June; but in the middle of August was, for financial reasons, returned to me by order of the Council. Much as I deplore the fact that the continuity of a series of articles on the same subject should be interrupted, it can hardly be expected that I should hold over important facts respecting the specific identity of types in the National Collection until the Entomological Society is in a position to print them.

The present paper completes the earlier group of Noctuæ represented by the Trifidæ of Guenée, and commences the Quadrifidæ. This natural grouping of genera was, unfortunately, not strictly followed out by its discoverer or by later authors, and its importance had to be insisted on by my friend, Mr. Hampson, before it was appreciated.

CYMATOPHORIDÆ.

Xylina mirabilis, from Japan, belongs to this family, and may be placed in the genus *Saronaga*, with which it agrees in

structure; its remarkable pattern is indicated in *S. pudens* of the United States.

CASANDRIA, Walk.

Casandria? filifera.

♂ *Laphygma filifera*, Walker, Lep. Het. xi. p. 719 (1857).

♀ *L. ferrocana*, Walker, l. c., p. 720 (1857).

♀ *L. nigriscripta*, Walker, l. c., Suppl. 2, p. 649 (1865).

St. Domingo and Jamaica. In Coll. B. M.

BRYOPHILIDÆ.

AQUIS, Walk.

Aquis viridisquama.

Aquis viridisquama, Walker, Lep. Het. xv. p. 1652 (1858).

A. albosparsa, Walker, l. c., Suppl. 2, p. 611 (1865).

Dimirica nubifera, Walker, Journ. Linn. Soc. vii. p. 56 (1864).

Borneo and Java. In Coll. B. M.

Bryophila discitincta, Walk., is *Pachnobia imperita*, Hübn. In my opinion, *Nolaphana* should be placed in the Bryophilidæ, as also *Pseudina*. The genera *Cosmodes*, *Canna*, and *Jaspidea* are probably Cymatophoridæ.

NOCTUIDÆ.

AGROTIS (auct.).

In his revision of this genus, Prof. John B. Smith has rather severely criticised my action with regard to some of the North American species, but especially *Amathes phyllophora* (to which, by the way, I must add *Mythimna subporphyrea*, Walk., as a synonym*). He points out that this species of Grote's differs in having spine-like bristles in rows along the anterior tibiæ, and he holds that these constitute not merely a good specific, but a good generic, distinction. It is possible that I may eventually have to use such apparently trivial characters for the breaking up of unwieldy genera; therefore, for the present, I will only say that, if constant, a character of this kind appears to be a sound one for distinguishing species.

Curiously enough, Grote mentioned the spinous character of the fore tibiæ in his description, yet, in his collection, specimens with and without these spine-like bristles stood together under both *phyllophora* and *alternata*; and although so good a lepidopterist as Grote would doubtless have discovered his error in labelling had he sat down to study his specimens, it was not to be expected that I should find out that an apparently variable character, in a series of specimens having the same pattern and allied to a variable European species, was of at least specific importance.

* Walker's type is slightly faded and without abdomen, but is certainly typical *A. phyllophora*, which it will probably supersede.

Prof. Smith writes to me that I ought to compare the descriptions of types before associating the latter as synonyms. He seems to forget that I have to deal with the species of the whole world, and that to compare all the descriptions of what I consider synonyms would occupy more time than can be spared, if our collection is ever to be got into working order. Moreover, the catalogues hitherto published have one great fault; they do not, as a rule, give references, so that I should have to make a catalogue of the United States species, with references, before I could discover where the descriptions were published. I do not profess to do anything of the kind; I compare Grote's, Harvey's, and other types in the Grote collection, with Walker's, Guenée's, and other types in our collection, and if I believe them to be identical I say as much; and Americans ought to be glad to get even this help in clearing up their doubts, though I lay no claim to omniscience, and do not pretend to be incapable of occasional blunders, such as omitting to observe spine-like bristles inserted between the scales on the fore tibiæ of an ordinary-looking Noctuid. I think if Prof. Smith reflects upon these few observations, he will be less inclined to use the lash to those who are honestly attempting to work, however imperfectly, in his interest, no less than that of other American lepidopterists.

"*Orthosia*" *guttilinea*, Walker, Lep. Het. xv. p. 1709 (1858), is a faded specimen of the European *Amathes xanthographa*.

"*Caradrina*?" *posticata*, Walker, Lep. Het. xv. p. 1695 (1858), is *Amathes rubi* of Europe.

TOXOCAMPA, *Guen.*

ECCRITA, *Led.*

Lederer separates *Eccrita* from *Toxocampa* on the ground that the primaries are narrower by about one-half, and that the middle and hind tibiæ are set with long thinly distributed spine-like bristles. The relative narrowness of the wings exists more in fancy than reality, and the few scattered spines are even better shown in the middle tibiæ of *Toxocampa enormis*, but on its hind tibiæ it has only half the number; similar spinous tibiæ, I should imagine, would also occur in *T. maxima*. A character such as this is far more trivial than the difference between simple and pectinated antennæ; and where the species with or without spines have, as Lederer admits, the same pattern and general structure, and their larvæ the same appearance and manner of life, it seems quite clear that the presence of spines is a specific, and not a generic, character. The variability in the number of spines militates strongly against its value as a generic character.

The right of the Toxocampids to family rank may be questioned. In my opinion they are simply Noctuidæ, and nearly related to

Graphiphora (*G. augur*). They certainly do not belong to the later group of Noctuites, to which they are generally referred, as the radial vein of the secondaries passes through the centre of the discocellular veinlet.* The larvæ also have sixteen legs.

Strenoloma of Grote is not a Toxocampid, but belongs to the later group of Noctuites, the radial being emitted close to the third median branch. The black collar deceived Grote, as it did me, in the case of four or five other genera allied to it.

SEMIOPHORA, Steph.

Semiophora ochracea.

Graphiphora viaria, Swinhoe, Proc. Zool. Soc. 1889, p. 412.

Umballa. Type in Coll. B. M.

This is only one of the many slight variations of this very inconstant species. The same form occurred in Mr. Hocking's series of *S. ochracea*.

MAMESTRA, Ochs.

Mamestra chalconia.

Noctua chalconia, Hübner, Samml. Eur. Schmiett., Noct., fig. 404.

Miana vineta, Walker, Lep. Het. xi. p. 730 (1857).

Celena? irrisoluta, Walker, l. c., p. 731 (1857).

Oligia tracta, Grote (see Check List, p. 28, n. 469).

United States. In Coll. B. M.

Mamestra radix.

Agrotis radix, Walker, Lep. Het. x. p. 332, n. 58 (1856).

Mamestra dimmockii, Grote (see Check List, p. 26, n. 350).

United States. In Coll. B. M.

HADENA, Treit.

Hadena arcta.

Hadena arcta, Lederer, Zool. botan. Vereins, 1853, p. 20, pl. 2, fig. 5.

Raphia fasciata, Butler, Ann. & Mag. Nat. Hist. ser. 5, vol. i. p. 193 (1878); Ill. Typ. Lep. Het. ii. p. 33; pl. xxxi. fig. 5 (1878).

Wladivostock and Japan. In Coll. B. M.

This species varies considerably in a long series, especially in size.

OLIGIA, Hübn.

Oligia festivoides.

Celena festivoides, Guenée, Noct. i. p. 220, n. 348 (1852).

Florida, &c. Coll. B. M.

* I have to thank Mr. Hampson for calling my attention to this valuable character for distinguishing the two great groups of this tribe of moths.

M. Guenée labelled his male variety with a name, which he appears not to have published. The species stood in the Grote collection as "*Hadena cephalica*, Grote"; but I do not find the species noted under *Hadena* in his Check List. We have his type.

The "*Nonagria*" *indubitans* of Walker belongs to this group, and is allied to his "*Laphygma*" *unisignata*, an example of which, in the Grote collection, is labelled, "? *Hadena paginata*, Morr." Walker's locality is based upon the fact that the specimen bears one of Doubleday's little yellow collecting-tickets. No locality is attached to the specimen.

Oligia exesa.

Celæna exesa, Guenée, Noct. i. p. 222, n. 352 (1852).

Hadena floridana, Walker, Lep. Het. Suppl. 3, p. 730 (1865).
Florida. Coll. B. M.

Walker's types consisted of a badly-rubbed male and a well-marked female, partly rubbed, but corresponding closely with Doubleday's other specimens, which formed the types of Guenée's species.

XYLOPHASIA, Steph.

Xylophasia apamiformis.

Xylophasia apamiformis, Guenée, Noct. i. p. 137, n. 216 (1852).

Hadena contenta, Walker, Lep. Het. vii. p. 754 (1857).

United States. In Coll. B. M.

HECATERA, Guen.

Hecatera erecta.

♂ *Celæna erecta*, Walker, Lep. Het. x. p. 264, n. 12 (1856).

♀ *Perigea*? *constipata*, Walker, l. c., xi. p. 734 (1857).

Perigrapha innexa, Grote (on type label).

Mamestra innexa, Grote (Check List, p. 27, n. 377).

United States. Coll. B. M.

This species does not nearly resemble any other species known to me. I place it here provisionally, as the superficial characters appear to correspond with those of *Hecatera*. A closer examination may subsequently prove it to be the representative of a new genus.

ANOMOGYNA, Stgr.

Anomogyna? *senescens.*

Hadena senescens, Grote (see Check List, p. 27, n. 438).

Orthosia? *semisigna*, Walker, Lep. Het. xi. p. 748 (1857).

United States. Coll. B. M.

This is probably not distinct from Herrich-Schäffer's *Noctua crasis* (Schmett. Eur. ii. p. 361, n. 554; Noct. pl. 28, fig. 139). The latter is smaller and less boldly marked than Grote's type, but corresponds pretty closely with Walker's type; the latter is, nevertheless, a badly-rubbed specimen, the identity of which with

Grote's insect is only rendered certain when the two are compared under a lens.

XYLINIDÆ.

LITHOPHANE, Hübn.

Lithophane antennata.

Xylina antennata, Walker, Lep. Het. xv. p. 1738 (1858).

X. cinerea, Riley, and *laticinerea*, Grote (see Check List, p. 33, nn. 773, 774).

United States. Coll. B. M.

I have spent a great deal of time without avail in the attempt to distinguish *X. laticinerea* from the larger specimens of Walker's species (the type is of the larger form). Grote's second specimen might, perhaps, be distinguished by the width of the central belt enclosed between the two ordinary transverse lines of primaries, and by the differently formed unbroken continuation of the orbicular spot; but this is clearly no more than an extraordinary variation of a very variable species, no two specimens of which are quite alike in markings, and which varies much in size. We have seven specimens labelled as *L. laticinerea*, nine as *L. antennata*, one as *Lithophane*, n. sp., and two as *L. cinerea*; the two last are the most distinct, because they are abnormally dwarfed specimens. If the whole of this series were to be mixed together, I do not believe any two lepidopterists would be able to agree as to how they should be sorted into two species again. Although I am personally satisfied of their identity, I have kept *L. antennata* separate from *L. laticinerea* in the cabinet, to see whether any lepidopterist will be able to imagine a character by which to distinguish them.

Walker identified specimens, without locality, of *L. pexata* as his *Lithomia buddhæ*, but he was totally in error; the description differs in almost every particular.

Lithophane signosa.

Xylina signosa, Walker, Lep. Het. xi. p. 627, n. 12 (1857).

Lithophane petulca, Grote (see Check List, p. 32, n. 763).

United States. Coll. B. M.

This is a rather variable species. Walker's type agrees better with Grote's second specimen than with his type, and still more closely with two other examples in his series. *L. signosa* approaches *L. ustistriga* of New Zealand in character, though in some respects it is nearer to *L. socia* of Europe.

The *L. signosa* of Grote's collection appears to me to be a perfectly distinct species, though identical with specimens collected by Mr. G. Norman in Canada, and presented to the Trustees in 1875, under the name of *L. petulca*. It differs in its comparatively broader and shorter wings, and generally greater resemblance to *L. socia*.

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

GYNANDROMORPHOUS LEPIDOPTERA.—I am preparing a list of gynandromorphous (hermaphrodite) Lepidoptera, and am desirous of making the list as complete as possible. I therefore venture to ask entomologists who may have any such specimens in their possession, particulars of which have not been previously recorded, to kindly communicate with me.—RICHARD SOUTH; 12, Abbey Gardens, St. John's Wood, London, N.W.

ACHERONTIA ATROPOS NEAR CHICHESTER.—A specimen of *Acherontia atropos* was taken in a village near this city, on June 15th. It had the appearance of having hybernated, though this may have been due to its having been roughly handled by its captor, a labourer, before it was brought to me.—JOSEPH ANDERSON, Jun.; Chichester.

THE EMERGENCE OF NOTODONTA TREPIDA.—Like Mr. South (Entom. 217), I, too, was indebted to the kindness of Mr. Christy for a few pupæ of *Notodonta trepida*, and was similarly struck with the erratic manner in which the moths emerged. It may be interesting to compare dates. The first moth came out on May 23rd, the second on May 28th, another on 31st; one on June 2nd, another on June 30th; the last, a small female, appearing on July 12th.—JOSEPH ANDERSON, Jun.; Chichester.

APATURA IRIS AND ARGYNNIS PAPHIA VAR. VALESINA NEAR BASINGSTOKE.—I had the pleasure of taking a fine male *Apatura iris* on July 18th, in a wood near Basingstoke; and, in company with my friend Mr. Holdaway, I was fortunate in taking *Argynnis paphia* var. *valesina* in Hawkwood Park, on July 26th, my friend taking two more the following week. Although we have collected in the same place for the last twelve years, we have never seen it there before or anywhere in the district.—A. H. HAMM; Reading.

PSYCHE PULLA.—Can any of your readers give me any information as to the habits of this species from personal observation or from any author, excepting Bruand? I always understood that the larva hatched at the end of summer, hybernated while small, and fed-up towards the end of spring, the imago appearing in the last week of May or early in June, sometimes even as late as July (? *radiella*). But on July 28th last my friend Mr. Vaughan found on grass a case, apparently of full size, which he kindly gave to me, knowing the great interest I took in the group. The case, when I received it, was firmly attached to the box, and remained so for about ten days, when the larva suddenly woke up, and has been lively and feeding ever since; but I can detect no increase in the size of the case. Other species of Psychidæ this year were unusually late, so this can scarcely be one of a second brood. Can it be that the larval state continues for two years, and that the larva hibernates when full-fed, and scarcely feeds in the spring at all?—C. A. BRIGGS; 55, Lincoln's Inn Fields, Sept. 14, 1891.

CAPTURES AT THE ELECTRIC LIGHT.—With reference to the note on this subject (*ante*, 172), I can confirm the fact of electric lights being often a great attraction for moths. The large incandescent lights on the Bund here, opposite the Grand Hotel, frequently have about twenty moths circling rapidly round them. The smaller lights on the Bluff, which give a poor and gas-coloured light, do not seem to have any special attraction for insects, although they are situated amidst trees, flowers, &c.; whereas

the Bund lights are on a wide bare road, running along the sea-shore. Towards dusk every evening a lot of fishing-boats collect near this part of the Bund, awaiting the lighting of the lamps in order to commence fishing. Lots of Japanese are also always to be seen fishing from the sea-wall there; so evidently the light attracts fishes as well as moths.—T. E. SANSOM; Yokohama, Japan.

DECOY FOR BUTTERFLIES.—I have noticed with interest Mr. South's remarks under the above heading (*ante*, 173). In various parts of the East I have found a dead *Ornithoptera* or *Papilio* an almost certain decoy, provided, of course, others of the species are about. In Java and Selangor (Malay Peninsula), when I caught a specimen too bad to keep, I always placed it in a convenient position for catching any others it might attract. Of course a good specimen could not be so treated, as in two minutes it would be carried off by ants. Here, in Japan, where ants, &c., are not so dangerous, I leave good specimens, also, for a few minutes, in conspicuous positions as decoys. With *Papilio maackii* it is certain to attract others. After half an hour or so the attraction seems to cease; so I doubt if a cabinet specimen of *Apatura iris* would be much use as a decoy.—T. E. SANSOM; Yokohama, Japan.

BAIT FOR LEPIDOPTERA.—I have tried, in Java and Selangor, both decaying bananas and decaying pine-apple as bait for butterflies, but without success. I have also added turpentine thereto, and likewise used turpentine poured on to sand, stones, paper, grass, favourite trees, &c., but in every case without success. It is but fair to add that turpentine alone was only tried by me on about five occasions; but, should I return again to the tropics, I shall make further experiments with it. An almost unfailling attraction in the tropics, and also here in the summer,—as the heat just now almost equals that of the Straits,—is clean wet sand in the bed of a stream, or even in a tiny brook, at the side of a road. In Selangor I have seen lovely moving patches of colour, consisting of yellow *Terias*, *Catopsilia*, scarlet *Appias nero*, orange *Hebomoia glaucippe*, and two or three large *Papilios*, swaggering about amongst the smaller fry. Unfortunately, the number of good "specimens" resulting from such a find is usually small. The other day—here, in Japan—I caught nine out of a dozen *Papilio maackii*, but only two were in decent condition. Wet sand has a great attraction for "blues."—T. E. SANSOM.

HOT SPRINGS AS AN ATTRACTION FOR ORNITHOPTERA BROOKEANA.—In connection with the preceding note, it may be of interest to mention that—from my own observations, and also from what others, both Europeans and Malays, have told me—this insect is strictly confined to the immediate neighbourhood of the numerous hot springs in Selangor. I believe the water contains sulphur, but not to any great extent. The only specimens of *Papilio delessertii* which I have caught or seen were settled on wet pebbles in the bed of a stream of hot water. To come across *Ornithoptera brookeana*, lazily flying about in such a spot, is a sight to be remembered.—T. E. SANSOM.

DWARF LYCÆNA ICARUS.—Diminutive specimens of *Lycæna icarus* (*alexis*) are by no means uncommon on the Downs near Eastbourne. I took three specimens last month (one male and two females), varying from 9 to 10 lines in expanse of wing. The *Lycænidae* would appear to be particularly liable to vary in size, for Mr. Cockerell, in his article on the

"Variation of Insects" (Entom. xxii. 177), mentions this peculiarity in *Lycæna corydon* and *L. comyntas*, in addition to *L. icarus*. According to Mr. Tutt's opinion, referred to in the same article, these dwarfed specimens of *L. icarus* have been "reared on isolated food-plants insufficient for their needs."—HENRY D. SYKES; The Cedars, Enfield, Sept. 21, 1891.

CUCULLIA ABSINTHII IN S. DEVON.—As it is a local insect, it may interest your readers to know that on August 19th, 22nd, and 31st last, I obtained about twenty young larvæ of *C. absinthii* by beating *Artemisia absinthium*, at Slapton in Devonshire. I should be glad to know whether the insect has been taken there before.—CHAS. BARTLETT; Branscombe, Redland Green, Bristol, Sept. 12, 1891.

ACRONYCTA ALNI IN SOMERSETSHIRE.—A fortnight since a larva of *A. alni* was found on a dwarf rose tree in my garden. It has since become a pupa, in a slight web. I would wish to note the first appearance of this species in this neighbourhood.—H. W. LIVETT; Wells, Somerset, Sept. 8.

SPHINX CONVULVULI NEAR YORK.—A fine example of *S. convulvuli* was taken about 8.20 p.m. on September 2nd, at rest on one of the stakes supporting a chrysanthemum, at Lincroft, near York. The night was very dark and warm.—W. HEWETT; 12, Howard Street, York.

LARVA OF HADENA PISI.—Yesterday I took several larvæ of *H. pisi* off heather, and naturally supposed they fed on it; but to-day, while watching them, I found them restless and apparently unsatisfied, though occasionally, very occasionally, one or another would just nibble a leaf or a flower of it. I then remembered that I had before now found the larvæ of *Saturnia carpini*, which are said to feed on heather, on willow; so I offered a leaf of that plant to one of these *H. pisi*. It took it at once; and now they are all feeding on willow as if it were their natural food. I may mention that, besides those I found on heather, I found one on furze and one on a small shrub, the name of which I do not know; and I noticed this morning that the leaves of this shrub, which I had put with the caterpillars, were entirely eaten, while the furze was untouched.—C. A. BIRD; Rosedale, 162, Dalling Road, Hammersmith, W., Sept. 18, 1891.

ASTHENA BLOMERI, &C., IN BUCKINGHAMSHIRE.—The Editor notes (Entom. 217) taking two specimens of *Asthena blomeri* on beech trees in a wood in Buckinghamshire. It may be interesting to some readers to hear that a few days ago I saw a long series taken in the same district and in the same way. My friend who took them was also lucky enough this spring to take a fine series of *Tæniocampa leucographa*.—A. MARSHALL; Sunnyside, Potter's Bar, Sept. 1, 1891.

LARVÆ OF LARENTIA DIDYMATA ON WOOD-SORREL.—In the last week of April, in a lane near here, I found a number of larvæ of this species feeding on the flowers of the wood-sorrel (*Oxalis acetosella*). The caterpillars were very numerous, there being several on almost every plant of wood-sorrel on each side of the lane for a distance of about half a mile. I took some, and fed them on the sorrel, which they eat readily; they sometimes attacked the leaves, but the flowers seemed to be their favourite food. They fed-up rapidly, and went down early in June. The first moth appeared on the 4th of July, and the last on the 6th of that month. I could find none of these caterpillars on sorrel, except in this one lane,

although I searched a good deal for them; and since the 19th of July, when I saw the first imago in a state of nature, the moth has swarmed here. Is not the wood-sorrel an unusual food-plant for this insect?—JOHN WILLIAM VAUGHAN, JUN.; The Skreen, Radnorshire, Erwood, R. So., August 22, 1891. [In North Devon the larvæ of *L. didymata* occur in profusion on the flowers of a coarse kind of grass growing in the woods. Around London I have frequently found the larva of this moth on *Lychnis diurna*. The Rev. J. Seymour St. John, in his 'Larva Collecting and Breeding,' gives *Anemone nemorosa*, *Chærophyllum temulum*, *Anthriscus sylvestris*, and *Vaccinium myrtillus* as food-plants.—R. S.]

BOMBYX LANESTRIS FIVE AND SEVEN YEARS IN PUPA.—From two larvæ of *Bombyx lanestris*, collected in June, 1882, Dr. A. Speyer bred one imago on April 4th, 1887, and the other in April, 1889. Both imagines were quite as fine as those which had passed but one year in pupa (Stett. Entom. Zeit., 1888, p. 205, l. c., 1889, p. 140).

CAPTURES AT SUGAR IN ARGYLLSHIRE IN SEPTEMBER.—I had come across three or four specimens of *Epunda lichenea* at rest on trees and posts, and so, on September 11th, I sugared along the road which runs through a wood, composed of oak and birch, on the shores of Loch Riddon, one of the arms of the sea which run up far inland into Argyllshire. The weather was very hot and the night still. The result was about—15 *E. lichenea*, 2 *Hydræcia micacea*, 1 *Triphæna orbona*, 2 *Calocampa vetusta*, 6 *Anchocelis rufina*, 1 *A. litura*, and 1 *Cerastis vaccinii*. On the 13th I sugared again in the same place. There was more wind this time, and torrents of rain were descending, so much so that it was difficult to keep the water out of the killing-bottles. There were several moths on each sugared tree, far more than on the previous occasion. *E. lichenea*, *A. rufina*, and *C. vetusta* were very common. There were also a few *Orthosia macilenta*, *O. lota*, *A. litura*, and *Calymnia trapezina*; and one worn specimen of *Calocampa solidaginis*. The *E. lichenea* are mostly worn. I have kept several females alive, and they are now depositing ova in cardboard pill-boxes. While sugaring I took a larva—*Amphidasys prodromaria*, I think. It is beautifully mottled with green and plum colour, and is only $1\frac{1}{2}$ inch long. It was crawling on a wire-fence.—T. M. CHRISTY; Watergate, Emsworth, Sept. 16, 1891.

LEPIDOPTERA IN DORSET, BERKS, AND OXON.—In West Dorset, during the last ten days of June and the first ten of July, crowds of moths were attracted by sugar. I took long series of *Aplecta herbida*, *A. rubricosa*, *Gonophora derasa*, *Thyatira batis*, *Xylophasia hepatica*, *Euplexia lucipara*, one *Neuria saponariæ*; while commoner things were troublesome by their abundance. The weather was chilly and unsettled, rain being frequent. On returning to Reading, *Noctua rhomboidea* put in its first appearance at sugar on July 18th, and on the following day commenced emerging in the pupæ-box. In August I obtained a large number of this moth at sugar; the worn females were boxed, and, as a result I have many larvæ feeding on plantain and chickweed. My last winter's experience makes me hopeful of getting a considerable percentage into pupæ. I found, when low plants were difficult to obtain, *N. rhomboidea* made no objection to sliced potato as a substitute. On August 10th, I took three *Cosmia pyralina*, and on the 14th I had the pleasure of taking all the *Cosmiæ*, including two more *C. pyralina*. Sugar was the mode of capture. In all, eight *C. pyralina* were taken during the week, a number unprecedented, I believe, in this district

in so short a time. This also establishes a new Reading locality for *C. pyralina*. Last week, in company with Mr. Holland, I had two fairly good nights; we took between fifty and sixty *Xanthia citrigo* by sugaring limes, and also had the good fortune to add *Charæas graminis* to the already long Reading list. Saturday I tried for *X. aurago* at Henley, but failed; sugar did not draw. It was also full early for *X. aurago*. I, however, got one *Stauropus fagi* larva by searching the beech after dark with my light.—J. CLARKE; Reading, Sept. 15, 1891.

AGROTIS RAVIDA AT CHINNOR.—During the past season I have taken six specimens of this species at sugar, five of them on the hill-slopes and the other in my garden. In an entomological contemporary, the editor has recently referred to this species as being “exceedingly rare” of late years. Entomologists will therefore be probably interested in knowing that in 1888 I caught about sixty specimens at sugar in Essex. Specimens taken by me at that time have been distributed into many collections in the country.—A. J. SPILLER; Chinnor.

LARVÆ AT CHINNOR.—On Aug. 10th, I took a full-fed larva of *A. alni* in the High Street of Chinnor; it spun up in a piece of raspberry-cane. Subsequently I took a second specimen, which died. Of *Stauropus fagi*, I found four examples by hard beating. I visited a locality for *N. cucullina* at some distance, and took twenty-seven larvæ during a short afternoon’s work. *A. aceris* larvæ have been plentiful on horse-chestnut trees; they are brought to me by boys, who dislodge the larvæ whilst throwing at the chestnuts. *Smerinthus ocellatus*, *S. populi*, *S. tilia*, and *Sphinx ligustri* all occurred as larvæ in my garden. On the beech, *D. coryli*, *H. prasinana*, *E. trilinearia*, *A. betularia*, *S. illustraria*, and *N. camelina* were fairly common; I reared three broods of this latter insect on apple, *B. consonaria* on birch, and a large number of *S. carpini* on raspberry in the garden. *E. lanestris* larvæ have been plentiful in confinement; they fed well on plum.—A. J. SPILLER; Chinnor, Oxon.

ARGYNNIS PAPHIA VAR. VALESINA NEAR LYNMOUTH.—While collecting near Lynmouth, at the beginning of this month, I took a specimen of the above variety. It was sadly battered, and was taken sunning itself on some brambles. Is it usual to find it in this part of the country?—ERNEST B. CHARLES; Glen Lyn, Lynmouth, North Devon, Sept. 22, 1891.

A DAY AT TUDDENHAM.—On the 14th of August last I went, with Mr. MacLachlan and Mr. Albert Houghton, to Tuddenham, where I obtained between forty and fifty larvæ of *Dianthæcia irregularis* in a very short time. Full-grown larvæ of *Lithostege griseata* were abundant. We also secured five or six larvæ of *Heliothis dipsacea* on *Silene otites*, when looking for *Dianthæcia*, and a number of those of *Hecatera serena*. One very small larva of *Anticlea sinuata*, found on bedstraw, since grown into a beautiful creature, I was especially pleased to get, as I had not seen the caterpillar of this species before.—GEO. T. PORRITT; Greenfield House, Huddersfield. [The very different experience Mr. Porritt and myself had at Tuddenham (*vide* Entom. 221) is, perhaps, only what might be expected, seeing how diverse the conditions were under which we respectively worked. Where such a course is practicable, it would be well to secure the services of a local collector, when we have but a day to devote to any noted locality, which, to us, may be *terra incognita*.—ED.]

OXYCERA TERMINATA, &c.—I see (Entom. 203) Mr. Billups records the capture of two species of *Oxycera terminata* at Oxshott. May I refer him to Entom. xxii. 84. Both my father and myself have taken it at Glanvilles Wootton and Lyme Regis as long ago as June 1st, 1830, and June 10th, 1865. It is quite true Mr. Verrall has placed it at the end of his list as reputed British, but I possess other species in the same predicament. I am rather surprised to find that *Oxyphora arnicæ* is considered to be a rarity, as I have always considered it to be otherwise, and found it so. Another little known species, *Tephritis plantaginis*, is common in July on the flowers of *Statice limonium*. I have both sexes of *Oxycera morrisii*, Curt., although Mr. Brunetti states, "The male is still unknown" (see Entom. xxii. 85).—C. W. DALE; Glanvilles Wootton.

HYPODERMA BOVIS, Deg.—A fine male of this very curious Dipteron was captured by myself while sweeping herbage near the powder magazine at Plumstead Marshes, on the 29th of July last. I was much struck by the very sluggish movements of the creature while in the net, the more so as Mr. Verrall informs me its flight is very rapid, and it is very difficult to catch. As the imago of this species is rarely seen on the wing, I thought the record of its capture might be interesting.—T. R. BILLUPS; 20, Swiss Villas, Copelstone Road, Peckham.

SIREX GIGAS IN IRELAND.—This insect is plentiful here this season. The larvæ are found at the end of borings which penetrate the trunks, roots, and branches of the silver-fir. The trees attacked were blown down some four or five years ago. The perfect insects may be seen at the end of the burrows with their heads protruding therefrom, and I secured several by the simple process of extracting them from the holes by means of a pin. To give some idea of the abundance of the insect in this place, I may mention that one stump of silver-fir, which I blew up with blasting-powder, contained hundreds of larvæ and pupæ of *S. gigas*.—J. H. LEECH; Kippure Park, Manor Kilbride, near Dublin, Sept. 10, 1891.

SIREX GIGAS IN NOTTS.—On August 1st, a fine specimen of *S. gigas* was taken here, in a chemist's shop, and presented to me. I have taken *S. juvencus* twice in the neighbourhood, and *S. gigas* occurs with fair regularity, though never commonly. The present specimen is the largest I have ever seen. It is a female, and in fine condition.—E. G. ALDERSON; Workshop.

SIREX GIGAS AT YORK.—I have had several specimens of this insect brought to me during the past few weeks, and all were in good condition.—W. HEWETT; 12, Howard Street, Fulford Road, York, Sept. 19, 1891.

SIREX JUVENCUS NEAR YORK.—A fine specimen of this somewhat rare insect was taken at Heslington, near York, on the 2nd September, whilst at rest on a chrysanthemum flower. It is now in my possession. Some seventy years ago this species occurred commonly on the towers of York Minster, and was locally known as "The Minster Fly"; but they entirely disappeared after the Minster was set on fire by Jonathan Martin, February, 1829.—W. HEWETT.

THE LOCUST (ACRIDIDIUM PEREGRINUM).—On my landing at Tangier early on the morning of June 3rd (for a brief stay of from three to four hours in Morocco, prior to the French Transatlantic Steamer, in which I had embarked from Cadiz, leaving at or about midday for Gibraltar), I took

a walk through the town and its fertile outskirts on the high ground in the rear, ever and anon picking up a lifeless specimen of *Acridium peregrinum* by the side of the road, or in the hedgerow, relics of the recent plague of those insects, which had wrought such enormous damage to the early crops, and had been gradually disappearing since Tuesday, May 26th, about eight days previous. I likewise managed to secure two living specimens, a male and female, in a vineyard; the body of a freshly caught male is of a beautiful tint, a bright daffodil yellow. Many of the dead ones that lay strewn about were in a very dry and dilapidated state, the head being missing, or the wings and legs loose. According to a Gibraltar newspaper, a cloud of these insects had settled on a steamer during its voyage from Marseilles to Tangier, filling the cabins and saloon, and covering the deck to a depth of four inches, and it took the sailors some hours to clear them away. On inquiring of Mohammed, the Moorish guide, attached to the Hotel Continental, who accompanied another English gentleman and myself in our early walk, as to whether a change of weather had contributed to their destruction, "God killed them," he emphatically replied. According to the statement of some, the millions of locusts in Morocco this season have exceeded in number even those that have devastated Algiers. Such was my first experience of the locust of the plague of Egypt.—F. A. WALKER; Dun Mallard, Cricklewood, N.W.

ERRATA.—Page 213, line 2, for "*P. stea*" read "*P. itea*"; line 10 from bottom, for "relects" read "relics."

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*September 2nd*, 1891.—Mr. Frederick DuCane Godman, M.A., F.R.S., President, in the chair. Mr. W. H. Blaber, of Groombridge, Sussex; Mr. T. D. A. Cockerell, F.Z.S., of Kingston, Jamaica; Mr. R. E. F. Hanson, B.A., of Tunbridge Wells, Kent; and Mr. R. C. Wroughton, of Poona, India, were elected Fellows of the Society. Mr. G. F. Scott-Elliot exhibited a series of various species of Diptera collected on Ranunculaceæ, Papaveraceæ, and Cruciferae. He said that during the past summer he had studied about forty species of plants belonging to the orders named, and that they had all been visited by insects which were probably necessary for nectariferous flowers. The majority of the Diptera caught were not confined to one species or even genus, but in view of the unmodified character of the flower in the orders named this was only to be expected. Mr. Verrall observed that certain insects affected certain plants, but that the Geraniaceæ were seldom visited. The discussion was continued by Mr. McLachlan, Mr. Kirby, and others. Mr. W. L. Distant exhibited a specimen of the orthopterous insect *Hemisaga hastata*, de Sauss., which, in the Transvaal, he observed to attack and feed on *Danais chrysippus*, a butterfly well known from its protective character and distasteful qualities to have a complete immunity from the usual lepidopteral enemies. The *Hemisaga* lurked amongst the tops of tall flowering grasses, being consequently disguised by its protective resemblance to the same, and seized the *Danais* as it settled on the bloom. From close watching and observation Mr. Distant could discover no other danger to the life of this well-known and highly protected butterfly. Mr.

T. R. Billups exhibited four species of Diptera, which he believed to be respectively *Oxycera terminata*, Meg., *Pipizella annulata*, Meg., *Clidogastra punctipes*, Meg., and *Oxyphora arnica*, L., taken at Oxshott, Surrey, on the 11th July last. He mentioned that all of them were recorded in Mr. Verrall's list only as "reputed British." He also exhibited a specimen of *Hypoderma bovis*, Deg., taken at Plumstead on the 29th July last. Dr. D. Sharp exhibited several species of Forficulidæ, and called attention to the diverse conditions of the parts representing the wings in the apterous forms. Mr. H. Goss exhibited living larvæ of *Scoria dealbata*, reared from ova. They were feeding on *Polygonum aviculare*, but not very freely; *Brachypodium sylvaticum* had been named as a food-plant for this species, but he did not find that the larvæ would eat this or any other grass. The Rev. Dr. Walker exhibited, and read notes on, a collection of Lepidoptera, Hymenoptera, Coleoptera, Neuroptera, and Diptera, which he had recently made in Norway. Mr. Champion, Mr. Billups, and Mr. M'Lachlan took part in the discussion which ensued.—H. Goss, *Hon. Sec.*

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—*August 27th*, 1891.—The President in the chair. Mr. Tugwell exhibited a series of *Bryophila perla*, Fb., from Kent, showing great variation, those from Deal being the orange form; and particular attention was called to some specimens collected by Mr. Austin at Folkestone, in which the usual white colour of the wings was replaced by a dark greenish shade. Mr. Tugwell also exhibited, on behalf of Mr. J. E. Robson, of Hartlepool, *Lycana astrarche*, Bgstr., collected at Durham, and showing the species in all its forms—vars. *salmacis*, St., and *artaxerxes*, Fab., with intermediate forms. Mr. S. Edwards, the genus *Charaxes*; and read notes on the distribution of the species, and descriptions of the larvæ and pupæ. Mr. J. H. Carpenter, under sides of *Thecla rubi*, L., bred from pupæ, and being strongly marked with white spots; he also showed *Eugonia quercinaria*, Hufn., bred from ova, which were unusually dark. Mr. Frohawk, *Pieris napi*, L., from different localities, and three females showing gradations in the formation of an additional spot between the third and fourth nervules; one male entirely white; pale and dusky forms of the female; and a banded form of *Pararge megæra*, L., taken at Chattenden, 1861. Mr. Mera, living larvæ of *Acronycta tridens*, Schiff. Mr. West (Streatham), the Lewes form of *Gnophos obscuraria*, Hb.; also an example of *Nenia typica*, with two tibiæ and tarsi on the left front femur. Mr. Turner, bred series of *Pelurgia comitata*, L., and of *Hypsipetes sordidata*, Fb., the latter showing red, pale, dark, and banded forms; he stated that the larvæ had been fed on a mixed diet. Mr. Turner also exhibited a living larva of *Stauropus fagi*, L. Mr. C. Fenn, *Odontia dentalis*, Schiff. (bred from *Echium*), *Hyria muricata*, Hufn., *Anerastia lotella*, Hb., *Crambus uliginosellus*, Zell., *C. contaminellus*, Hb., and *Sericoris conchana*, Hb., from Deal and neighbourhood. Mr. H. A. Sauzè, a case of Coleoptera, containing twenty-six species. Mr. Billups, British Diptera, including *Nemoræa strenua*, Meig., from Oxshott, *Eristalis sepulchralis*, L., a male, taken at Plumstead; also a female of the rare *Hypoderma bovis*, Deg., *Phytomyza aquilegiæ*, Hardy, reared with its parasite *Rhizarcha areolaris*, Nees, from leaves of the columbine growing in his garden at Peckham. Mr. Billups also exhibited *Polysphincta varipes*, Gr., and a cocoon of *Attacus cecropia* from New York State, received from Mr. Turner, and from which he had bred forty-eight specimens of a species of *Cryptus*, closely allied to the British *Cryptus digitatus*, Gmel.

September 10th.—The President in the chair. Mr. W. F. Robinson, of Notting Hill, was elected a member. Mr. S. G. C. Russell exhibited a large number of *Argynnis selene*, Schiff., from North Hants localities. Mr. Carpenter, a fine series of *Pericallia syringaria*, L., bred from ova received from Essex; and of *Dianthæcia albimacula*, Bork., bred from larvæ obtained in Kent. Mr. Frohawk, a series of *Polyommatus phlæas*, L., and pointed out the advantage of rearing this species from ova, as those bred were much larger than captured specimens. Mr. Joy, a melanic specimen of *Boarmia repandata*, L., taken at Hampsfelt, near Grange. Mr. Tugwell remarked that it was the same form as that which Mr. Porritt got in his district, and, in reply to Mr. Tutt (who stated that Mr. Porritt obtained his black examples of this species from a very dark fir-wood, and inquired whether the locality from which the specimen now exhibited came answered this description), Mr. Joy said he took it on the trunk of a larch tree on the edge of a larch plantation, which was not at all dark, the specimen being very conspicuous on the tree-trunk. Mr. R. Adkin showed a series of *Psodos coracina*, Esp., bred this spring, from Rannoch, and he pointed out that in some of the examples the band was cut right through. Mr. C. Fenn, about fifty caught specimens of *Agrotis corticea*, Hb., showing the variation of the species at Deal. Mr. Tugwell and Mr. Jenner Weir remarked that many of the specimens ran extremely close to *A. cinerea*, Hb. Mr. Barker exhibited a dark variety of *Arctia caia*, L., and Mr. Weir remarked that he had once seen a series arranged according to whether the antennæ were white or blackish, and he thought it would be of interest if members would look at the antennæ of their specimens of this insect. Mr. Short exhibited varieties of *Arctia caia*, L.; in one example the white markings of half of the superior wings were absent. Mr. Short called attention to the fact that the ordinary cream marking of many of the specimens he exhibited was strongly tinged with a rosy colour. Mr. Tugwell showed examples of *Melitæa aurinia*, Rott., from English, Irish, and Scotch localities, and made some observations on the local variation of this species; a discussion ensued.—H. W. BARKER, *Hon. Sec.*

LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY.—Sept. 14th, 1891.—The opening meeting for the winter session. S. J. Capper, F.L.S., F.E.S., in the chair. Mr. C. H. H. Walker read a paper on "Nerves and Nervous Systems," describing the general structure of the nervous system of a typical insect and comparing it with that of a spider, and pointing out the close affinity, which differs only when the economy of the subject rendered it necessary. The paper was illustrated with carefully executed black-board drawings. Among the numerous exhibits, the president showed specimens of the new *Tortrix donelana* from Galway. Mr. Walker, curious varieties of *Vanessa antiopa*, which he had bred from Canada, the black subterminal band and the blue spots being quite absent, and the yellow border very wide. Mr. Melville, a fine specimen of *Charocampa nerii*, captured at Prestwich in 1846. Mr. Newstead, several cases of life-histories, including the full history of *Sirex gigas*, which he stated had been very common this year. Mr. Prince, a fine variety of *Arctia caia*, bred by him this year, the fore wings of which were almost quite brown, and the black spots on the hind wings formed a thick dark marginal band. Mr. Gregson, a series of *Lithosia sericea*, taken this season. Mr. Harker, *Dianthæcia barrettii* from Howth.—F. N. PIERCE, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—*August 17th, 1891.*—Mr. R. C. Bradley in the chair. Mr. G. W. Wynn showed bred series of *Bombyx rubi* and *B. quercus* from Sutton; a single specimen of *Chærocampa porcellus*, taken at Sutton last June; a series of *Notodonta dictæa*, bred from larvæ found on Cannock Chase; and a single specimen of *Plusia bractea* from Bewdley. Mr. P. W. Abbott, large series of *Zygæna filipendulæ* and *Z. trifolii* from the Isle of Wight, including yellow varieties of the former species; of the latter species, quite 75 per cent. of the specimens taken were varieties, with the spots more or less coalesced. Mr. R. C. Bradley, *Scatophaga scybalaria* from Sutton Park. Mr. C. J. Wainwright, *Phytometra anea* from Wyre Forest.—C. J. WAINWRIGHT, *Hon. Sec.*

OBITUARY.

E. W. JANSON.—A well-known member of the entomological fraternity will be missed in Edward Wesley Janson, who died at his residence in Stroud Green on the 14th of last month (August). He was born at Hackney on the 14th March, 1822, and was therefore in his seventieth year. He received his education at the college of La Flèche, in France, and subsequently studied for the medical profession at Edinburgh, but relinquished the career at his father's wish, in order to assist him in his business as Dutch merchant in the city, and afterwards as secretary of the Dutch-Rhenish Railway. On the death of his father, in 1867, he commenced business as a natural-history agent, publisher, and bookseller, in which he continued until compelled by failing health to retire in February last. Like all true naturalists, his taste for this pursuit was innate and declared itself at an early date. He began as a collector, and his happy hunting-grounds were the then little-frequented Highgate Woods and Hampstead Heath, in the neighbourhood of his father's residence. His speciality was Coleoptera, and he soon became not only a skilful and successful collector, but a scientific authority on the British species, much respected by his colleagues. In the course of time he extended his studies to the products of the whole world, beginning with the Staphylinidæ, and afterwards taking up the Elateridæ, his collection of which ultimately became the largest ever known. As an author he was almost painfully accurate and laborious, and, on this account probably, published but little. He wrote the Coleopterous portion of the 'Entomologist's Annual' from its commencement in 1855 to 1861, and contributed also several papers on ants'-nest beetles. He compiled the descriptive part of the Coleoptera of the edition of Curtis's 'British Entomology' published in 1863; wrote various papers in the 'Zoologist' and 'Transactions of the Entomological Society'; edited one of the English editions of Figuiet's 'Insect World'; and lastly, in 1882, contributed a paper to the 'Cistula Entomologica' on the Elateridæ collected by Buckley. For many years he filled the post of Secretary and Librarian to the Entomological Society, of which he had been a member since 1843. Among the scientific property he leaves behind him are his matchless collection of the Elateridæ and allied families, and a library of great extent and value. His collection of British Coleoptera was ceded many years ago to Mr. G. R. Crotch, and now forms part of the University Museum at Cambridge.

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TORTRIX DONELANA, CARPENTER.

FOR several months past the occurrence of a supposed new species of the genus *Tortrix* has been an open secret among entomologists in this country, but very little information concerning it has so far found its way into our entomological journals. The following abstract of a paper entitled "A new Species of *Tortrix* from Tuam," by George H. Carpenter, B.Sc., Assistant Naturalist in the Science and Art Museum, Dublin,* may therefore be interesting to readers of the 'Entomologist':—

Early in June of last year (1890) Mr. D. O'C. Donelan, of Sydan, Tuam, forwarded to me some pine-shoots, with small caterpillars, which, he stated, had caused much damage, in the summers of 1889 and 1890, to a plantation of firs situated partly on bog and partly on upland tracts. Some of the caterpillars pupated very soon after arrival. About the middle of July three moths (all males) appeared, and my surprise was great to find that they very closely resembled *Tortrix viburnana*.

It appears to be identical with the moth figured in Herrich-Schäffer's 'Schmetterlinge von Europa,' vol. iv. fig. 419, as a variety of *Tortrix steineriana*, Schiff. This figure, however, is very unlike the true *T. steineriana* (*op. cit.* vol. iv. figs. 57–8), and the author, in his Appendix (*op. cit.* vol. vi. p. 155), expresses his opinion that it is a distinct form. Heinemann ('Die Schmetterlinge Deutschlands und der Schweiz,' vol. ii. p. 46) identifies this figure of Herrich-Schäffer's with the *Tortrix lusana* of that author; but neither the figure nor my specimens agree with this opinion. Besides, the larva of *T. lusana* is stated by Heinemann to feed on *Vaccinium*.

We may therefore conclude that, except for Herrich-Schäffer's unnamed figure, the moth from Tuam is new to science. I have much pleasure in describing it under the name of *Tortrix donelana*, as a tribute to the gentleman who discovered it.

* 'Scientific Proceedings of the Royal Dublin Society,' vol. vii. pt. ii. p. 91, pl. vii. (1891).

TORTRIX DONELANA, sp. nov.

Imago.—The expanse of the wings varies from 17 to 20 mm. The costa of the fore wing is well arched at the base, and then runs straight to the tip, which is rather pointed. The hind margin is very slightly convex, except at the anal angle. The ground colour of the fore wings is yellowish brown, with a bronzy appearance, which in certain lights gives them an olive-green sheen. Near the tip of the fore wing is a brown costal spot, and an oblique irregular brown band crosses the wing from the middle of the costa to the anal angle. A few thin, brown, curved lines run from the costa towards the inner margin, between the oblique band and the hind margin, towards which their convexity is directed. The distinctness of all these brown markings varies greatly, as the fore wings of one of my specimens appear almost unicolorous yellowish brown, with a bronzy lustre, much resembling *T. viburnana*. The hind wings have the hind margins decidedly concave below the tip; their upper surface is dark grey. The fringe is silvery white. Beneath, the fore wings are blackish, and the hind wings whitish grey. The labial palps are of moderate length, and, together with the head and thorax, are covered with brown scales, those on the thorax being darkest. The abdomen is *short, hardly reaching the anal angle of the hind wing*. It is clothed with dark grey scales, and the anal tuft is light yellow.

Larva.—The larva is of the ordinary *Tortrix* type. It is olive-green dorsally, yellow laterally, and yellowish green ventrally, with dorsal and lateral rows of yellowish white spots, from which spring blackish hairs. Its length is 11 or 12 mm. The head and the posterior part of the last abdominal segment are yellowish brown, marked with black.

Pupa.—The pupa is brownish black. Each of the abdominal segments (except the first and the last) is provided with two half rings of spines, by means of which the pupa can move in its cocoon.

Habitat.—Tuam, Co. Galway, Ireland.

Time of appearance.—Larva: April to July. Pupa: June and July. Imago: July and August.

Food-plants.—Scotch fir and larch.

Habits.—The larva feeds on the pine-shoots, which it seems to almost divest of their leaves. Mr. Donelan writes:—"The caterpillar appears in two or three different ways. It fastens together two shoots, and forms a nest of web; when disturbed it creeps out at the top, and, falling to the ground, tries to hide in the heath, &c.; or some of the pine leaves are fastened together on a single shoot, and the nest of web is formed within. Sometimes a few of the caterpillars are found on the shoots without any covering; this generally happens later in the season than the former." The cocoon in which the pupa is contained appears to be formed by the closing up of the web in which the larva had sheltered. The cocoon is surrounded by a mass of scale-leaves.

It seems very strange that this apparently unnoticed insect should have made its appearance in such numbers as to force attention by its damage to plantations. Mr. Donelan, who has had considerable experience of pine-woods, says it is the worst pest he has seen in Ireland. Equally strange is its occurrence in such a remote district of the British Isles as Co. Galway.

Mr. Donelan tells me that the young trees on which the larvæ were found came from Scotland, and may have been originally imported from the Continent. Hence, if the identification of *T. donelana* with Herrich-

Schäffer's figure be correct, we may have here an insect so rare on the Continent as to have escaped observation as a pine-feeder (no mention whatever is made of it in Kaltenbach's 'Pflanzenfeinde' or Ratzeburg's 'Forst-Insekten'), but which, imported to the West of Ireland, found there so favourable an environment as to become a dominant member of the insect fauna. The fact that all the modern fir-trees of Ireland have been imported (Moore and More, 'Cybele Hibernica,' p. 151) makes the importation of the insect highly probable.

On the other hand, may it be possible that we have had lately developed in our islands a really new species, an offshoot of *T. viburnana*, which for some unknown reason has changed its food-plant? If this view be accepted, we must give up the identification of *T. donelana* with Herrich-Schäffer's figure.

Mr. Adkin has been good enough to lend me a pair of this insect, which he bred from a larva and pupa received from Ireland in the early part of July this year. Examination of these specimens, and careful comparison with a long series of *Tortrix viburnana*, enables me to support Mr. Barrett's opinion that *donelana* is not separable from *T. viburnana*.

It is stated that *donelana* varies in the marking of the fore wings, and one of Mr. Carpenter's specimens resembles ordinary *viburnana* so closely that it would probably be difficult to point out any material difference. The abdomen of the type of *donelana* is described as "short, hardly reaching the anal angle of the hind wing." As this is the only portion of the description which is italicised, some importance would appear to be attached to it; but in the male specimen bred by Mr. Adkin the abdomen is quite of the length usual in *T. viburnana*, i. e., it extends a little beyond the anal angle. The anal tuft of *donelana* is said to be light yellow; some specimens of *viburnana* have the tuft yellowish, others greyish, and in others again it is brownish. With regard to the marking on fore wing, Mr. Adkin's male example of *donelana* differs from the type, as described and figured by Mr. Carpenter, in having a basal patch and broad internally angulated marginal band of the same colour as the central fascia; I have a specimen of *viburnana*, taken on the Yorkshire moors, which is marked very much in the same way.

Mr. Carpenter refers to the male only. The female example bred by Mr. Adkin from the larva, adverted to, is small, but I should have pronounced it to be a female *T. viburnana*, if it had been sent to me for identification; with the exception of its lesser size, it is almost identical with a specimen I have from the Warren at Folkestone.

Some entomologists would seem to consider this fir-feeding *Tortrix* identical with *T. steineriana*, Hüb., var. *dohrniana*, H.-S., but whether it is so or not I cannot say, as I have not the necessary material at hand to enable me to form an opinion. I certainly have a single continental specimen ticketed *dohrniana*, but this

is exactly identical with certain British *viburnana*, which are probably not very unlike the specimen of *donelana* resembling *viburnana* referred to by Mr. Carpenter.

RICHARD SOUTH.

THE DIAMOND-BACK MOTH (*PLUTELLA CRUCIFERARUM*).

BY J. ARKLE.

ALTHOUGH the year 1891 has not been marked by the appearance of attractive and welcome insects, such as *Colias edusa* or *Deilephila galii*, it may be handed down to entomological posterity as celebrated for the occurrence of a moth which, if diminutive in size, brought itself into prominent notice by its pestiferous abundance. Happily, it may be added, many entomologists, at any rate in western Britain, are unacquainted with this little turnip moth, which has shown a power, during the past summer months, to work destruction from the shores of the Forth to those of The Wash. It is the *Cerostoma xylostella* of Curtis—not, it may be observed, the beautiful hook-tipped *C. xylostella* of Stainton—the *Harpipteryx xylostella* of South! In the genus *Cerostoma*, Stainton describes the pupa as being enclosed in a close, firm cocoon; while, as we consider this matter of synonyms, it is worth noting that his adopted *Plutella* is distinguished by a cocoon of open network. Mr. South also adopts *Plutella* in his 'Synonymic List,' and, in common with Stainton, he uses the appropriate specific name of *cruciferarum*.

Although this insect-pest occurs more or less, year after year, in the infected districts, the question naturally arises—What is the reason of its extraordinary abundance this season? Possibly it may be as mysterious an apparition as *C. edusa* or *D. galii*—or the advantages in aid of hybernation may have been exceptional during the winter—or it may have come to us from across the sea! The migratory, or blown-over, theory may receive some support from the following story, which I take from 'The Liverpool Daily Post' for Aug. 15th:—"Mr. H. A. Paynter, solicitor, Alnwick, told Mr. Raynard, Inspector of the Board of Agriculture, that, being requested by Lord Walsingham to try and get him some moths, he (Mr. Paynter) proceeded, on July 10th, to the Longstone Lighthouse, on the Farne Islands, where he found the rocks close to the lighthouse covered with them. On questioning the three lighthouse-keepers upon this remarkable occurrence, they informed him that such a great cloud of moths was driven over by the north-east wind that they were obliged to keep sweeping them off the lantern throughout the whole night in order to allow the light to be seen at sea." The paragraph then goes on to say that "this statement made by the lighthouse-

keepers would conclusively prove (?)—the query is mine—that there had been a large importation of these moths from abroad, as in most cases the outbreak of the caterpillar occurred soon after that date.”

Not only, however, has this insect-pest been conspicuous for its abundance on this side of the globe, but, according to ‘The Cheshire Observer’ for Oct. 10th, it “has also done an immense amount of harm this year to the turnip crops in New Zealand and Tasmania.” The migratory, or blown-over, theory must therefore credit this insect-speck with an organisation which enables it to continue on the wing for 400 or even 1000 miles, or to sail such distances on the wings of the wind.

Leaving this problematic part of the subject, let me say I obtained almost full-fed larvæ of *P. cruciferarum* from Northumberland, Durham, and Yorkshire in the first week of August. With Lincolnshire I was unsuccessful, as my correspondent there happened to be from home, and the larvæ had disappeared before his return.

Some of the readers of the ‘Entomologist’ may be interested to know that the caterpillar—dorsally and underneath, legs and claspers—is pea-green. In some specimens there were indications of a dorsal, and on each side a subdorsal, stripe of a deeper green. The head is pale green, faintly tinted with purple, and ornamented with minute black spots. This description also applies to the second segment. Each segment has a couple of rings of minute tubercles, and each tubercle emits a short black hair or bristle. The anal claspers are considerably porrected, or stretched out behind, and they give a very bifurcated appearance to the termination of the caterpillar. Such is the aspect under a strong magnifying-glass. To the unassisted eye it is simply a short green caterpillar, five-twelfths (nearly half an inch) long, and tapering at both ends. It feeds on turnips, cabbages, cauliflowers, and, as Stainton observes, “other Cruciferae.” It is very partial to the under sides of the leaves, and falls off the food-plant on being disturbed, or wriggles about and away, either head or tail first, after the manner of *Tortrix* larvæ. When shaken off its food-plant it generally suspends itself by a silken thread, by means of which it can speedily return.

My caterpillars began to pupate on the 11th of August. At first the chrysalis is pale green, but changes in a few hours to light grey, with smoke-coloured streaks, visible to the naked eye. The pupa is a quarter of an inch long, and can be easily seen through the spindle-shaped cocoon of open network, which is fastened either to the upper or under side of a leaf. The caterpillars showed a marked preference, in spinning up, for the gauze covering of the flower-pot. Under a good magnifying-glass the cocoon appears to be made of whitish silken ropes, arranged in irregular meshes across the chrysalis, which, with its smoky markings, is very distinctly seen.

The moths began to appear on August 23rd, and had all emerged by Sept. 13th. In size and general coloration they strongly resemble the ordinary clothes' moths. The following description is obtained through the medium of a strong magnifier:—Antennæ long, slate-coloured, and spotted with white. The palpi are very conspicuous, brown, and porrected. The head and thorax are the same general brown colour of the upper wings. The body is a silvery dark grey or slate-colour, the segmental divisions light grey spotted with white, and there is a conspicuous anal tuft of silvery grey. The fore wings are narrow, brown, and spotted with black, especially at the outer margins, where the spots chiefly form two parallel lines. Extending along the inner margin, and nearly its entire length, is a long dash or stripe of very light brown, or, as in many examples, of light ochreous-colour. This stripe is broad (about one-third of the wing-breadth), and has three angular "projections" stretching into the dark brown colour of the wing; these projections are bounded by a thin line of pale shining ochreous-colour, or, as in frequent specimens, of white. The whole of the wing-surface is dotted irregularly with minute black spots, the middle area is very dark brown; in some specimens it is almost black; the inner marginal stripe is then much paler, and the wing, especially the costal margin, dusted with white scales. When the wings are closed the projections of light colour assume a diamond pattern: with good eyesight this pattern is visible, especially in the dark specimens. The lower wings are a silvery slaty grey, with long marginal fringes of the same shade.

Before considering what the agriculturist can effect in necessary war against this insect-pest, it is interesting to observe what Nature provides for its suppression. Probably no living creature has a harder time of it than our insect of the diamond-back. Should it appear even in thousands, so apparently does the deadly ichneumon: at least one-half of my larvæ, especially those from Durham and Yorkshire, were so infected. If the two species of ichneumons I bred are peculiar to *P. cruciferarum*, how then did *their* extraordinary abundance arise? Were their progenitors already in anticipation on British shores, or did they follow the cloud of moths to the lonely rocks and lighthouse of the Farne Islands? No record appears on this latter point from the three keepers. These ichneumons are so pretty and so interesting that I venture to describe them as below:—

(1). The most abundant. Size, that of the moth, or nearly so. Head, thorax, and body black. Antennæ the length of the body, stout, smooth, and curved upwards. Wings rounded and transparent, nervures black. The wings reflect the most beautiful rainbow colours, chiefly pink, purple, and pale green. Legs russet-brown. The ovipositor is black and simple; it is attached to a plate underneath the abdomen, and near its termination; it

is blunt, and shaped like a cavalry sword with a curve upwards. All this, however, is only the sheath; this sheath is composed of two halves, which open at the base, like the arms of the letter V. Between these arms is the real ovipositor, brown, polished, and pointed. I was able to examine the real ovipositor only by drying the insects; the muscles controlling the sheath were then contracted, the sheath opened and the ovipositor was exposed.*

(2). Much less abundant than No. 1. Same size. Head, thorax, and body black; under side of body yellowish green. Legs russet-brown. Long black antennæ the length of the body and curving upwards, not smooth, but knotted. Wings transparent, nervures black, not so rounded as in No. 1. The wings reflect the same beautiful tints, chiefly pale green. The ovipositor is shaped like a small y, the right arm of the letter being at least twice the length of the other; it is attached under the abdomen, as in No. 1, but by each of the arms.

The moth emerges at one end of the cocoon, leaving hardly a trace of exit; the ichneumon saws an ugly round hole through it near the end.

Such is a description of some of Nature's agents, and in their operations lies apparently an exhibition of Nature's plan. The ichneumons, the birds, the climatic helps, only clear off a portion of these pests. Man is evidently expected to investigate, to help himself, and to look upon these natural aids as allies. Looking through the letters of my correspondents, I find that, where the birds were properly looked after, *P. cruciferarum* has been least hurtful. On the other hand, where the birds have been decimated, there the scourge has apparently been most conspicuous. As an illustration, a correspondent from "an anti-rook and bird district" speaks of "whole fields having been stripped" by the caterpillar, and of such spectacles as "nearly a dozen crows and a sparrowhawk nailed to a tree through the head."

Sometimes the diamond-back is eccentric in its ravages. A twenty-four acre field in Lincolnshire, where, by the way, the Act for the Preservation of Birds is strictly enforced, had eleven acres white turnips and the remainder swedes. "The whites," says my correspondent, "were entirely ruined, but the swedes were untouched. As soon as the pest was discovered the crop was ploughed in," rape or late globes, I suppose, being afterwards sown.

Passing by compensation from the State for reasonable loss as a matter more for the agriculturist and the politician, the following remedies from my own correspondents may be offered as matters of greater interest to the entomologist:—

(1). Fields should be kept clear of cruciferous weeds, such as the well-known yellow-flowering "kale"; fences, refuse-heaps, headings, and vacant spaces should not be forgotten. (If I

* Doubtless *Limmeria gracilis*, Grav.—E. A. F.

remember rightly, Miss Ormerod prescribed this, long ago, in her admirable book on Injurious Insects).

(2). The crop should be destroyed (ploughed in) upon the first appearance of the caterpillar.

(3). Insecticides, whether in liquid or powdered form, appear to be, in this case, of very doubtful value; they are expensive, and liable to be washed off by the first shower of rain. Besides, the caterpillars are often on the under sides of the leaves. In short, while Nature's battalions may be depended upon to make the attack in force, man's part would seem to lie more in the cutting off of supplies.

Chester, October 12, 1891.

CAPTURES AT THE ELECTRIC LIGHT.

BY ROBERT ADKIN, F.E.S.

ON the 8th of September last I visited the Royal Naval Exhibition at Chelsea. The day was hot, and the evening one of the few that we have been favoured with during the past summer, when one could sit out-of-doors with impunity. By eight o'clock darkness had set in, and the powerful electric arc-lamps, by which the grounds are illuminated, having been turned on, I fully expected to see moths circling round them in some numbers; but to my surprise they were conspicuous by their absence, and during an hour that I was walking about the grounds only some two or three were seen. About nine o'clock I ascended the lighthouse, and on reaching the outer gallery surrounding the light my eye at once fell upon a moth sitting upon the glass, then another, and another, until upon further examination the place seemed alive with them; numbers were circling round in the air, others lay trampled under the feet of the crowd of people that were walking about the gallery, while others rested, apparently asleep, upon the glass; and this, too, under most adverse circumstances, for, although it appeared to be quite calm while walking on the ground, a gentle breeze was blowing at this elevation, and setting in a direct line from the chimneys of the tier of boilers used for driving the electric machinery, brought with it hot sulphurous fumes that made the air almost unbearable. The species that appeared to be most common were, as one might expect in such a locality, *Triphæna pronuba* and *Plusia gamma*, but, not being prepared with the necessary paraphernalia for an entomological expedition, I was unable to make any large number of captures. As, however, I happened to have three small boxes in my pocket, I filled them at random from the moths that were sitting on the glass; these, upon subsequent examination, proved to be *Drepana binaria*, *Plusia gamma*, and *Pionea forficalis*. One

of the attendants, who happened to see me boxing them, volunteered the information, "Oh! do you want them things? There's plenty of them up here every night; great big 'uns, too, sometimes"; but unfortunately I could elicit no further information that would give me any clue as to what manner of moths the "big 'uns" might be. This lighthouse is, I believe, modelled on the same lines, as regards external appearance and size, as the original, which now stands upon the Eddystone Rocks, and the light is of similar brilliancy; if that be so, the light is some hundred and thirty feet from the ground, and its capacity many times greater than the numerous lamps around it, which after my descent were as little frequented as they were earlier in the evening.

In a note on "Captures at the Electric Light" (*ante*, 243), Mr. T. E. Sansom points out that at Yokohama the powerful exposed lamps are very attractive to Lepidoptera, whereas the smaller lamps, although situated more directly in the position where the moths would be likely to fly about, seem to have no particular attraction for them. At a meeting of the Entomological Society of London, Canon Fowler mentioned that moths were attracted by an electric light fixed upon Lincoln Cathedral during the Jubilee illuminations, *Acronycta alni* and *Leiocampa dictæa*, which he exhibited, being among their number.

It will be noted that in two of the cases mentioned a comparison may be drawn between lights of greater and lesser brilliancy, and in each the more powerful lights drew many moths to them, whereas those of less power had little, if any, attraction for them; and in two also the lights were at a considerable elevation, but their height proved no obstacle to their attractiveness. The inference therefore appears to be that a light of high power placed in an exposed position is likely to draw the largest number of moths to it, even attracting them from less powerful lamps in its vicinity, and it would be interesting to note whether this rule holds good in all cases where a comparison between two or more lights, or sets of lights, of unequal power and position is practicable.

Lewisham, October, 1891.

ADDITIONAL NOTES ON THE ENTOMOLOGY OF OXSHOTT.

By T. R. BILLUPS, F.E.S.

AMONG the unidentified species of Hymenoptera-Aculeata, &c., referred to by me, *ante*, p. 202, were *Priocnemis hyalinatus*, Fab.; *Pompilus spissus*, Schiödte (this species was very plentiful); *Trypoxylon clavicerum*, St. Farg., *Crabro palmarius*, Schreb., several males of which were taken; and *Andrena fuscipes*, Kirby. The latter was common on *Erica*, &c.

ICHNEUMONIDÆ.—Two specimens of *Agrothereutes hopei*, Gr., and one of *Pezomachus bellicosus*, Foerst., were taken by sweeping clover. *Anomalon cerinops*, Gr., *Campoplex oxyacanthæ*, Boie, *Nemeritis macrocentra*, Gr., and *Banchus moniliatus*, Gr.; a single specimen of each was captured. Two specimens each of *Tryphon trochanteratus*, Holmgr., and *Thersilochus jocator*, Fab., with a solitary female of *Polyblastus pinguis*, Gr., complete the list of Ichneumonidæ proper. The Braconidæ having representatives in *Meteorus ictericus*, Nees, *Chasmodon apterus*, Nees, *Alysia manducator*, Panz., *Dapsilarthra apii*, Cur., and *Cœlinius niger*, Nees, a single type of each being taken. *Megaspilus fuscipes*, Nees, *Helorus anomalipes*, Panz., and *Spilomicrus nigriclavus*, Marsh., representing the Oxyura. The additions to the Tenthredinidæ were two females of the not common *Athalia lugens*, Ste., beaten from *Clematis vitalba*; a solitary female of *Nematus glutinosæ*, Cam.; and one of the uncommon *Pamphilius sylvaticus*, Klug. The subfamily, Anacharides, being represented by *Anacharis typica* and *eucharoides*, Walker.

DIPTERA.—Amongst those undetermined in my last paper are the following:—*Odontomyia viridula*, F., fairly common; *Leptis tringaria*, L.; *Pœcilobothrus nobilitatus*, L., very plentiful, hovering round a little running stream of water; two females of the very handsome *Cynomyia mortuorum*, L., were captured, but with some difficulty, their flight being very rapid; *Pollenia vespillo*, F., *Limnia oblitterata*, F., and *Loxocera albiseta*, Schrk., was fairly numerous; the delicate little *Micropeza corrigiolata*, L., was abundant, but only to be taken with extreme caution, if one wished to have perfect specimens; *Trypeta serratula*, L., *Tephritis leontodontis*, Deg., and *Euaresta conjuncta*, were also captured, but seemed exceedingly scarce; *Lauzania ænea*, Fln., and *Parhydra coarcta*, Fln., complete my list of captures in Diptera.

HEMIPTERA.—The seventeen species taken were as follows:—Two specimens of the not common *Sehirus morio*, Lin.; *Derophysia foliacea*, Fall.; *Monanthia cardui*, Lin.; *Salda saltatoria*, L., this species was in numbers, jumping about in the short damp herbage; *Leptopterna dolobratus*, L., was very plentiful; *Lygus pratensis*, Fab., common; *Oncognathus binotatus*, Fieb., also common; *Ætorhinus angulatus*, Fieb., fairly plentiful; three specimens of *Globiceps flavomaculatus*, Fab., and two of *Cyrtorhinus caricis*, Fall., were captured; while *Orthotylus nassatus*, Fab., and *Heterotoma merioptera*, Latr., were common on the nettles, &c.; *Psallus sanguineus*, Fab., was plentiful on some dwarf willows; a small birch producing *Psallus roseus*, Fall.; while several specimens of *P. alnicola*, Dougl. & Scott, were beaten from alders; *Plagiognathus viridulus*, Fall., was very plentiful on nettles; and several specimens of *P. roseri*, H.-Seff., were taken on willows.

COLEOPTERA.—Although some twenty-seven species were

obtained, none of them are worthy of particular attention, and I simply enumerate the species taken. Among the Geodephaga, *Cicindela campestris*, L., was common, and, together with a single specimen of *Pterostichus cupreus*, L., were the only two representatives of this family. Among the Staphylinidæ were *Thiasophila angulata*, Er.; *Homalota atramentaria*, Gyll., and *H. fungi*, Gr.; *Bolitobius atricapillus*, F., *B. trinotatus*, Er., and *B. pygmæus*, F.; *Mycetoporus lucidus*, Er., *M. lepidus*, Gr.; and *Oxyporus rufus*, L.: all from fungus. *Stenus flavipes*, Steph., and *S. similis*, Hbst., were plentiful by sweeping. A dead rabbit producing *Choleva tristis*, Pz., and *C. chrysomeloides*, Pz., and also two specimens of *Hister cadaverinus*, E. H. *Coccinella hieroglyphica*, L., was very plentiful; a single specimen of *Geotrupes pyrenæus*, Charp., representing the Scarabæidæ. *Helodes livida*, F., was common, as also was *Malthinus fasciatus*, Fall., and *M. punctatus*, Fourc.; a single specimen of *Tillus elongatus*, L., was captured flying; several specimens of *Notoxus monoceros*, L., were taken; *Sitones lineatus*, L., was common, as also *Hypera polygoni*, L.; while *Bruchus cisti*, F., absolutely swarmed; and, lastly, *Cryptocephalus fulvus*, Goeze, was obtained commonly by sweeping low herbage. Very many other species might have been taken, but I was not on Coleoptera bent. The three Orthopterons are as follows:—*Gomphoceros rufus*, L., very common; *Tettix bipunctatus*, L., and *T. subulatus*, L.

NOTES ON THE SYNONYMY OF NOCTUID MOTHS.

By ARTHUR G. BUTLER, F.L.S., F.Z.S., &c.

(Continued from p. 242.)

Lithophane lambda.

Noctua lambda, Fabricius, Mant. p. 174 (1787).

Lithophane thaxteri, Grote (see Check List, p. 33, n. 783).

Europe and United States. Coll. B. M.

L. thaxteri is typical *L. lambda* = *rufescens*, Mén. The species in Europe varies considerably, both in the definition of the markings of the upper surface and the colouring of the under surface. The variety *L. somniculosa* = *lapponica* varies below from deep reddish to reddish buff; whereas the variety *L. zinckenii* is ochraceous, without a tinge of the red colouring.

L. contenta of Grote is extremely close to *L. lapidea* from Europe; but I am not satisfied that they are one and the same species, although the individuals of *L. lapidea* show considerable variation, both as regards pattern and depth of colour.

The *Nolaphaninæ* appear to me to be a superfluous group. *Adipsophanes*, which is a synonym of *Catabena*, Walk., and

Crambodes, Guen., appear to me to be only slightly aberrant *Leucaniidæ*; whereas *Nolaphana* is much nearer to *Bryophila* in character, as already stated.

CATABENA, Walk.

Catabena lineolata.

Catabena lineolata, Walker, Lep. Het. Suppl. 2, p. 631 (1865).

Adipsophanes miscellus, Grote (see Check List, p. 33, n. 801).

United States. Coll. B. M.

The *Xylininæ* and *Cucullinæ* appear to me to be allied to *Xylophasias*. *Cucullia clausa* of Walker, which was without any register-label, and the locality of which was consequently unknown to Walker, appears to me to be a dwarfed and worn specimen of *Eucalimia absinthii* of Europe.

CALLÆNIA, Hübn.

This is quite distinct from *Cucullia*, the form, length, and style of coloration of the primaries being entirely different; the pattern and character of the larvæ also differ considerably.

Callænia lactucæ.

Noctua lactucæ, Schiffermüller, Wien. Verz. p. 74, n. 7.

Cucullia intermedia, Speyer (see Grote's Check List, p. 33, n. 796).

Europe and United States. Coll. B. M.

I can find absolutely no difference between specimens from Europe and North America. At first I thought that the New World insect had rather a longer costal margin, and consequently a more oblique outer margin to the primaries; but Grote's second specimen does not show this difference.

Xyлина spoliata, Walk., Lep. Het. xi. p. 750, is typical *Septis mucens*, Hübn.; and *Xylophasias sectilis*, Guen., is a dark variety of the same.

HELIOTHIDÆ.

HELIOTHIS, Ochs.

Heliothis armigera.

Noctua armigera, Hübn., Noct. pl. 79, fig. 370 (1805-24).

Heliothis pulverosa, Walker, Lep. Het. xi. p. 688, n. 17 (1857).

H. conferta, Walker, l. c., p. 690, n. 21 (1857).

Var. *H. umbrosus*, Grote, Proc. Ent. Soc. Phil. vol. i. p. 219 (1861-3).

Var. *H. succinea*, Moore, Proc. Zool. Soc. 1881, p. 443.

Europe, Asia, Africa, America, Australia. Coll. B. M.

This species shows considerable individual variation in size and coloration. *H. umbrosus* also differs in pattern, the black patches on the under surface being very feebly indicated and narrower. *H. succinea* is exactly like *H. umbrosus*, excepting

that it is considerably smaller. We have a good many of both forms; and if *H. umbrosus* is not distinct, *H. succinea* must also be a variety; there is no character on the upper surface of the wings to separate either of them. It is possible that the *H. rubrescens* and *H. separata* of Walker may be varieties of *H. armigera*. The former appears to be strictly confined to Australia, but the latter has a wide distribution; there are specimens in the museum from the Navigator's Islands, Queensland, Java, Formosa, Shanghai, Japan, and the Congo. The pattern of both surfaces in each of these forms differs from that of typical *H. armigera*; and, therefore, in the absence of actual proof of their identity, it is better to permit them to stand as distinct species.

Heliothis dipsacea.

Noctua dipsacea, Linneus, Syst. Nat. xii. p. 856.

Var. *Heliothis adaucta*, Butler, Ann. & Mag. Nat. Hist. ser. 5, vol. i. p. 199 (1878); Ill. Typ. Lep. Het. iii. p. 19; pl. xlv. fig. 4 (1879).

Europe, Amur, Japan. Coll. B. M.

Very variable in size in a large series.

Heliothis scutuligera.

Heliothis scutuligera, Guenée, Noct. ii. p. 180, n. 932.

H. errans, Walker, Cat. Lep. Het. iii. p. 769 (1865).

South Africa. Coll. B. M.

The species, wrongly identified by Walker with *H. spinosa*, *H. definiens*, and *H. punctifera*, are nearly allied species, not belonging to *Heliothis*.

As Grote suggested (Check List, p. 36, footnote), his *H. nuchalis* is not distinct from the European *H. scutosa*. I am not, however, prepared to say that *H. phlogophagus* is identical with *H. dipsacea*; the latter always has a far less undulated submarginal pale line on primaries, and a better defined dusky nebula from reniform spot to inner margin; it is usually, though by no means invariably, smaller.

HELIOCHILUS, Grote.

Heliochilus inflatus.

♂ *Anthœcia inflata*, Wallengren, Wien. Ent. Monatschr. iv. p. 172, n. 60 (1860).

♀ *Perigea albidentina*, Walker, Lep. Het. Suppl. 2, p. 680 (1865).

Honolulu (*Wlgr.*), Florida. Coll. B. M.

In all probability, *H. paradoxeus*, Grote, will prove to be a pale form of this species; at present it holds its place fairly well, from the absence of intermediate grades to the dark type, although the pattern is identical in the two forms.

LEOCYMA, Guen.

Nearly allied to *Pippona*, Harvey, of which genus it is probably the East Indian representative.

Leocyma tibialis.

Bombyx tibialis, Fabricius, Syst. Ent. p. 578, n. 76 (1775).

Leocyma dianæ, Guenée, Noct. ii. p. 213, n. 982 (1852).

Chasmina glabra, Walker, Lep. Het. Suppl. 2, p. 636 (1865).

India to Australia. Coll. B. M.

The genus *Thiganusa*, Walk., will take as its type *Leocyma apollinis*, Guen., = *T. euproctisoides*, Walk., Lep. Het. Suppl. 3, p. 979 (1865). Walker places the genus in the Ophiussidæ; but although Guenée was wrong in confounding it with the other species which he placed in *Leocyma*, it was a little nearer the mark than where Walker placed it. The genus should be placed near to *Xanthodes* = *Acontia* true.

Leocyma judicata.

Acontia judicata, Walker, Lep. Het. xv. p. 1760 (1858).

Chasmina linea, Hampson, Ill. Typ. Lep. Het. viii. p. 73, pl. cxlv. fig. 3 (1891).

India (Nilgiris). Types in Coll. B. M.

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

CIDARIA RETICULATA VARIETY.—This season I have bred a fine large specimen of the above. The centre of the fore wings black: the elliptical mark is only visible by a strong glass. I cannot describe it; it looks like an eclipse, with such an almost imaginary tracing of the mark which is so conspicuous on the ordinary form.—J. B. HODGKINSON.

SATYRUS IANIRA, VAR.—At Morthoe, North Devon, on August 10th, I took a "bleached" male *Satyrus ianira*, having about three-quarters of the right hind wing (upper and under surface) almost colourless.—G. RENSCHAW; Sale Bridge House, Sale.

VARIETY OF *LYCENA CORYDON*.—Whilst butterfly-hunting near Eastbourne on the 5th of September last, I captured a curious variety of the female of *Lycena corydon*. Both the anterior and posterior wings possess the usual discoidal spot and marginal band of eye-like spots on the under surface; the colour, however, of the anterior wings is whitish, like the normal colour of the under side in the male, and only three black spots—the lower ones of those composing the usual row of seven—are visible. The posterior wings are of a brownish colour streaked with white, and the only other marking, besides the discoidal spot and marginal band, is the white submedian blotch. A somewhat similar variety is recorded from Lulworth, Dorsetshire, by Mr. Alfred T. Stiff (Entom. xxii. 160). — H. D. SYKES; The Cedars, Enfield, Oct. 11, 1891.

NOTE ON LYCENIDÆ.—At the sand-hills near Lytham, in Lancashire, on September 12th of this year, I took a dwarf male *Lycæna icarus*; also, a few days afterwards, a male *Lycæna adonis* in good condition. Is not this rather northerly as a locality for the dwarf butterfly, and also for *L. adonis*?—G. RENSCHAW; Sale Bridge House, Sale, near Manchester.

EFFECT OF AMMONIA ON THE OVA OF LEPIDOPTERA.—Some ova of *Pericallia syringaria*, deposited July 18th, were accidentally placed in the ammonia-jar, where they remained four hours. This treatment destroyed the vitality of about half the number; the others hatched out on Aug. 4th, but all the larvæ died in their second moult. On a previous occasion a batch of the eggs of *Hadena oleracea* were deposited with some moths in the lethal chamber, and at the end of one hour removed therefrom. The moths were then dead, of course; but the eggs were not destroyed, as they produced larvæ in due course; but, as these were turned adrift to forage for themselves, the effect of the ammonia, if any, upon them is not known.—RICHARD SOUTH; 12, Abbey Gardens, St. John's Wood, N.W.

EFFECT OF CYANIDE OF POTASSIUM ON THE COLOUR OF GONOPTERYX RHAMNI.—I noticed in the 'Proceedings of the Entomological Society,' May 1st, 1871 (quoted in Entom. for 1871, p. 323) a statement concerning a variety of *Gonopteryx rhamni*, to the effect that "Mr. Janson said he had noticed that yellow insects killed by cyanide of potassium became red."—R. M. PRIDEAUX.

PUPE WANTED FOR TEMPERATURE EXPERIMENTS.—I am greatly in want of a number of pupæ of British Lepidoptera for the purpose of carrying out some experiments on the result of change of temperature upon their emergence during an approaching voyage to the tropics, and shall be much obliged if any of my old correspondents or others will kindly supply me with some. My wish is to get as great a variety as possible, and the commonest species will be acceptable. They should be sent to the address below not later than the middle of November, and forwarded in common boxes that will not require to be returned, as my time is limited. Their receipt will be promptly acknowledged.—GERVASE F. MATHEW (Fleet Paymaster); H.M.S. 'Tyne,' Chatham.

ACRONYCTA ALNI LARVA NEAR MANCHESTER.—In case Sale, about six miles from Manchester, has not been recorded for *Acronycta alni*, I may mention that one August I took a larva from an alder tree in a friend's garden.—G. RENSCHAW; Sale Bridge House, Sale.

LARVA OF ACRONYCTA ALNI AT CLIFTON.—Whilst beating maple for *Ephyræ omicronaria* larvæ, here in July last, down came a tiny larva of *Acronycta alni* into the tray. It is so marvellously like a bird-dropping in this stage that, unless previously known, it might be excusable to pass it over as such. After feeding and growing well for some time, it finally died, for no apparent reason, but I was able to preserve the skin by inflation.—R. M. PRIDEAUX; 9, Vyvyan Terrace, Clifton, Bristol.

PUPATION OF ACRONYCTA ALNI.—Mr. W. H. Livett, in referring to the larva of *Acronycta alni* (Entom. 245), mentions it having turned to a pupa in a slight web. Is this an occasional or a frequent custom? In 1889 I found two larvæ in this district, one on the horse-chestnut, the other on a beech tree. Finding, from Newman, that this larva also bored into stems for pupation, I placed some stems of the chestnut, about the size of one's finger, when they appeared ready for pupation. It was very interesting

watching them excavate the stems from the ends; one, unfortunately, being stung, died before it had finished; but the other, having bored far enough in, reversed itself, sealing up the entrance with a fine web and particles of the pith it had thrown out, and emerged the following season a beautiful specimen.—T. B. JEFFERYS; Cirencester, Oct. 2, 1891.

PHIBALAPTERYX LAPIDATA, &C., IN STIRLINGSHIRE. — On Sept. 13th of last year I succeeded in getting five specimens of this rather local insect on some marshy ground near Fintry, Stirlingshire. This year I was unfortunately prevented from visiting the locality until the 19th, when I went over the ground along with a friend. We found the moths fairly plentiful, but nearly all in a more or less wasted condition. We will, however, get a very fair series each from our captures. When at rest on the rushes, *P. lapidata* bears a very striking resemblance to a large pug. Amongst other things netted during the day were—*Larentia cæsiata*, *Chesias spartiata*, *Celæna haworthii* (in great abundance), *Hydræcia nictitans*, *Charæas graminis*, *Tapinostola fulva*, &c. During the past season I have taken in the same district—*Emnelesia ericetata*, *Carsia imbutata*, *Agrotis lucerneæ*, *Plusia bractea*, *P. festuæ*, &c. — E. C. EGGLETON; Glasgow, Sept. 22, 1891.

NOTES FROM ROTHERHAM.—The season up to the middle of September has been, I think, one of the worst ever experienced in this district. Sugar has to a very large extent been a failure; several nights the sugared trees produced nothing at all, others a few solitary *Triphæna pronuba* came, and a few other common things; two nights in late June were fairly good, when *Thyatira batis* and *T. derasa* came freely. The weather during the day seemed all you could wish, wind S.W. and a nice breeze promising well; but as soon as the sun went down the wind dropped, and a heavy dew came on, making it unpleasant to get about, and insects do not fly much when there is a heavy dew. Larvæ have also been very scarce, compared with some years; very irregular as to size, and for the most part badly “stung.” Out of forty-five *Triphæna fimbria*, only nineteen produced pupa, and other things were almost as bad. The best find this year was *Xanthia citrigo*; after working for years for this insect, some seasons getting one or two only, I this year, quite by accident as it were, stumbled across the larva in almost any quantity.—JOHN A. YOUNG; 85, Fitzwilliam Road, Rotherham.

SPHINX CONVULVULI AT RIPON.—On Sept. 25th I had brought to me a fine specimen of *S. convulvuli*, found at rest in a garden in the centre of the town. As far as I am aware, this is only the fourth appearance of the species in this neighbourhood.—C. CHAPMAN; Museum, Park Street, Ripon.

NOTE ON THE SECOND BROOD OF CIDARIA TRUNCATA. — At the end of June I captured a female *C. truncata (russata)*, and she deposited a small batch of ova, which hatched July 20th. The larvæ fed up rapidly on willow, and were all full-grown by the end of August. The first imago emerged on the 18th September; sixteen others followed, the last emerging on the 6th October.—WM. NEWMAN; 21, Russell Street, Darlington.

NOTE ON THE PAIRING OF AMPHIPYRA TRAGOPOGONIS. — On Sunday morning last (October 4th) a friend of mine found a pair of insects *in cop.*, which were brought to me for identification, and found to be *Amphipyra tragopogonis*; they remained coupled until noon on Monday. Some time

during the afternoon of that day they separated, and the female deposited a few ova. I placed the box on one side, intending to take out the insects when a few more ova were laid. On Wednesday I looked at them, and was very much surprised to find that they had coupled again. Since the second coupling the female has laid about 150 to 200 eggs. Is it not unusual for the same pair of insects to copulate twice?—J. N. YOUNG; 85, Fitzwilliam Road, Rotherham.

LARVA OF ODONTOPTERA BIDENTATA. — I should like to suggest that the larva mentioned by Mr. Christy (Entom. 246) is probably that of *Odonoptera bidentata*, as I have known larvæ of this species vary much in the direction of that which he describes. It is certainly a disappointment to breed nothing but a typical *O. bidentata* from such a striking creature.—R. M. PRIDEAUX.

NOTE ON HESPERIA THAUMAS. — Newman, in his 'Natural History of British Butterflies,' speaking of *Hesperia thaumas* (linea), says:—"It . . . has mysteriously disappeared from many places where it was formerly common." A particularly striking instance of this has come under my notice lately. I discovered *H. thaumas* in a field here in 1888; it was then extremely abundant; it was equally common at the end of June and the beginning of July in 1889, but for the last two years I have not turned up a solitary specimen, although I have frequently visited the locality. I have caught *H. sylvanus*, which I discovered there at the same time, every year. This disappearance of *H. thaumas* is to me quite unaccountable: I certainly have not exterminated it, as I did not take more than thirty or forty specimens altogether. — HENRY D. SYKES; The Cedars, Enfield, Middlesex, Sept. 14, 1891.

LARVA OF HADENA PISI.—I have had two larvæ of *Hadena pisi*, which were found feeding on the common bracken in South Wales; they will also feed on *Aspidium filix-mas*, and I have seen this larva also on dwarf salallows, but cannot certify they feed thereon.—T. B. JEFFERYS.

NOTES ON SOME LEPIDOPTERA IN YORK DISTRICT.—*Nudaria senex*.—This insect, like *Phibalapteryx lignata*, has not been so numerous with us of late years (and doubtless from the same cause). The evenings on which I have found it most abundant are those ushered in by a good shower of rain, especially if there be a slight mist rising from the ground. It is easily taken, as it flies slowly over the tops of the reeds, grasses, &c., or ascending the grass-stems. It does not long remain in good condition, and unfortunately, like many other species, flies most abundantly when getting worn. After its flight, which lasts but a short time, it may be taken not uncommonly at rest on the sedges. On a favourable evening from 40 to 50 or 60 specimens may be taken before dark by one collector.

Orthosia suspecta at York, season 1891.—This local species (which was first discovered at York by Mr. T. H. Allis in 1855) has been taken here this season in considerable numbers, and has been unusually common, as many as 1000 specimens having been taken on one night. In fact, I can without hesitation affirm that, during the eleven years I have collected Lepidoptera, I have never seen any species to equal it in numbers, as it even exceeded such species as *Xylophasia polyodon*, *Apamea oculatea*, *Agrotis exclamatoris*, *A. segetum*, *Calymnia trapezina*, or *Triphana pronuba*, which in favourable seasons are about the commonest Noctuæ at sugar. From

amongst a great number that I have had to select from, I have picked out some very beautiful, and in many instances striking, varieties, of which about fifty of the best now adorn my collection. These vary from light and dark grey to various shades of brown, and to a very dark form, almost black. To fully and accurately define the many different shades of red met with in a large selected series of this species would tax the ability of a specialist in colours; a few examples are beautifully mottled. It would have been possible for anyone to have taken a fair number each evening from off the trees which had been sugared the previous night. I frequently counted three or four on the trees when renewing the sugar; some of these found their way into the treacle-pot, and helped to thicken the mixture. It was a difficult matter to box a single specimen at a patch, as two, three, or more would drop in at the same time. As a rule, those specimens which dropped into the net from off the patches, unless specialities (by which I mean varieties), were set at liberty, as I found it best and quickest to select them from off the trees. I am glad to state that, after sacrificing many female specimens, I succeeded in obtaining fertile ova from two, *viz.*, sixty from one, and twenty from the other, and that next year I hope to see a full and detailed description of the larva (which I understand has not, so far, been described) in the pages of the 'Entomologist.'

Plusia festucae. — This handsome species occurs pretty freely at York, and may be taken, in company with *P. chrysitis*, *P. iota*, and *P. pulchrina*, flying over the flowers of the ragged robin, to which it seems especially partial. I have found the chrysalis attached to the sedges and to the leaves of the gale; it requires a smart, quick stroke with the net to catch *P. festucae*, as, if once missed, it does not often give its would-be captor another chance. The females are darker, smaller, and usually quieter, when in the net, than the males. The second brood does not occur with us at York. It is not unusual for a collector to take from 20 to 25 specimens before dark.

Geometra papilionaria. — This remarkably fine species occurs with us some seasons not uncommonly. It is generally taken in the imago state, and flies some eight feet from the ground; it is not a difficult species to net, and a very pleasant one to box. With regard to the question now on the *tapis* as to its hour of flight: from my experience with this species, and as the result of conversation with other entomologists who have taken it in greater numbers than myself (and I have taken a good many), I unhesitatingly affirm that the best time to catch *G. papilionaria* is about 11 p.m., or from that to midnight, and then again just before dawn, at both of which times it occurs more commonly than at dusk, although of course I have taken odd specimens then, and indeed all through the night. When at rest upon a birch-leaf or grass-stalk, it requires a practised eye to detect it. The larvæ, too, bear a wonderful resemblance to the stalk of the birch-leaves on which they feed; the young larvæ seem to prefer the buds to the open leaves, and thus kill the twig on which they feed.

Collix sparsata has never been known to occur here in anything like the numbers that it appeared this season. It simply swarmed. I never remember having seen any *Geometræ* so common before; the only species that vie with it in number are *Ypsipetes elutata*, *Melanippe subtristata*, *Larentia didymata*, *Melanthia rubiginata*, and *Epione vespertaria*: some of the specimens taken were almost black. It would have been possible for a collector to have taken 100 specimens, or even more, before dark. It usually flies low in the rides of the wood in which it occurs. The flowers of the buckthorn seem to be especially attractive to it. Its flight does not

last long, and it is a species which soon becomes worn. The larvæ are of a pale greenish colour, and are found in August on *Lysimachia vulgaris*, the handsome yellow flowers of which are very conspicuous in the locality where *C. sparsata* occurs; they pupate amongst dead leaves.

Phibalapteryx lignata. — This insect has been fairly common with us this year, although in nothing like its former numbers of some five to six years ago. The improved drainage of the ground on which it occurs seems to have diminished its numbers considerably. As is doubtless well known, it is a double-brooded species, the first brood appearing here about the 8th or 10th of June, and it may be taken from that date till the end of the month. The best night I had with *P. lignata* this season was on June 20th last, when I took some fifty specimens, including one very dark example; and, with the exception of two or three *Cabera pusaria*, it appeared to be the only insect on the wing; the night was cold and clear, with the wind due east. The second brood, which are smaller and darker than the first, appear about September 6th, and I have taken it from that date till the end of the month; it does not then occur so numerously as in June. It is one of those species that is seldom met with in any numbers in first-class condition. Take *P. lignata* when you may, there is sure to be a large percentage of more or less worn specimens. — WILLIAM HEWETT; 12, Howard Street, York.

A DAY AMONG THE "BUTTONS."—Many years ago I promised myself, in the then future, an excursion to the New Forest in search of varieties of *Peronea cristana*, but until the present season I have been unable to spare time when they would be at their best in point of condition. Mr. Bond used to say, the greater part of his long and varied series was the result of one expedition, and visions of what I might also capture almost haunted me when I was "hot" on Tortricæ. It was then with much pleasure that I lately received an invitation from Mr. Meek (who has taken up his residence at Brockenhurst) to join him in hunting up the head-quarters of the species in his locality. With most perfect weather in our favour, we were able to secure a fine assortment of varied forms. The principal of these were *brunneana*, *ustulana*, *spadiceana* (with and without a vitta), *sericana*, *desfontainana*, *bentleyana*, *cristalana*, *striana*, *cristana*, *subvittana*, *alboflammeana*, *chantana*, *fulvovittana*, *albovittana*, and several others new to me, including one with the whole wing and tuft of a uniform blue-black. Master Willy Meek worked like a Trojan, and secured almost as many specimens as his father. I was not so fortunate, nor was the fourth net of our party. There is a charm about "buttoning" that can only be appreciated by the variety collector, and each specimen missed is regretted more than would otherwise be the case, for it is of course impossible to tell what variety the beating-stick may next disturb from the bushes; but it is hard work, as the stiffness of my arms testified next morning. Mr. Meek tells me it has always been a day-dream of his, to retire from business to some good centre for collecting, where he could not only enjoy his favourite pursuit, but have a crust of bread and cheese to give an old friend or passing brother collector. Certainly he treated me very much more handsomely, and upon my leaving presented me with all the specimens taken during my stay; these included not only the "buttons," but about a score of *Sarothripa revayana* and *Leptogramma literana*, and a variety of smaller things, such as *Coriscium brongniardellum* and *C. citrinella*. — SYDNEY WEBB; Dover.

FORTHCOMING WORKS ON BRITISH ENTOMOLOGY.—Messrs. L. Reeve & Co. announce that they are about to bring out a new work on 'The Lepidoptera of the British Islands,' by Charles G. Barrett. It is proposed to publish two editions, one on large paper, with hand-coloured plates, the other on small paper in volumes. The same publishers have also in hand 'The Hemiptera-Heteroptera of the British Islands,' by Edward Saunders. This will be issued in eight parts, with coloured plates.—ED.

ENTOMOLOGICAL PINS.—We have received the following letter from Messrs. Kirby, Beard & Co. (Limited):—"We notice in the September number of the 'Entomologist' you make a few remarks with regard to the difficulty of procuring really good, strong, well-pointed, black, entomological pins. We quite agree with all you say, and admit that, owing to the fineness of the wire, it is very difficult to obtain really good points, and for the same cause there is great liability of the pins becoming soft during the process of enamelling. But we wish to state that we have at length succeeded in producing a pin which we think has all the qualities you suggest, and which should answer all requirements; it is made of steel, so cannot bend, and does not produce verdigris, and, having a needle-point, will penetrate any reasonable substance; whilst, being enamelled black, it has all the appearance of the ordinary brass one. So, far, we have only made these pins in the larger or continental sizes, as the demand has not been sufficient to enable us to produce the smaller sizes; we think, however, it is only owing to the fact of their not being sufficiently well known, and so should be glad if you will kindly find space for this letter in your next issue."

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—October 7th, 1891.—Dr. David Sharp, F.R.S., Vice-President, in the chair. The Chairman referred to the death, on the 14th September last, of Mr. E. W. Janson, who had been a Member of the Society since 1843, and who had formerly filled the offices of Secretary and Librarian respectively. The Rev. Dr. Walker exhibited a long series of several species of *Erebia*, and of *Argynnis pales*, which he had recently captured near Roldal, in Norway. Mr. W. L. Distant exhibited specimens of *Danaïd chrysippus*, with its two varietal forms, *alcippus*, Cram., and *dorippus*, Klug., all which he found together in the Pretoria district of the Transvaal. Mr. Jenner Weir, Colonel Swinhoe, and Mr. Distant took part in the discussion which ensued as to these forms and their distribution. The Rev. W. F. Johnson sent for exhibition specimens of *Velia currens* from stagnant water near Armagh; also a specimen of *Nabis limbatus*, killed whilst holding on to its prey, a very hard species of Ichneumon. Mr. Saunders thought that, from the nature of the Ichneumon, the only chance the *Nabis* had of reaching its internal juices would be through the anal opening, as recorded by Mr. E. A. Butler in a similar case, in the Ent. Mo. Mag. Oct. 1891. Mr. F. P. Pascoe exhibited two British species of Diptera, unnamed. He said they had been submitted to Mr. R. H. Meade, but were unknown to him, and are probably new to the British list. Mr. R. Adkin exhibited two specimens of a supposed new species of Tortrix (*Tortrix donelana*, Carpenter), bred from larvæ found on pine trees at Tuam. Mr. C. G. Barrett said he examined the specimens

with great care, but he did not consider that they belonged to a new species. He was unable to distinguish them from *Tortrix viburnana*. Mons. A. Wailly exhibited preserved larvæ, in various stages, of *Citheronia regalis*, which he had bred from ova received from Iowa, United States. He said that the natives called this larva the Hickory Horned Devil, and that the specimens exhibited were the first that had been bred in this country. Mons. Wailly further exhibited three female specimens of *Antheræa yamai* bred from cocoons received from Japan; also a nest of cocoons of *Bombyx radama*, received from the west coast of Madagascar. Prof. J. B. Smith, of the United States, and Col. Swinhoe took part in a discussion on the habits of the larvæ of *Citheronia regalis*, and as to the period at which they dropped their spines prior to pupating. Dr. Sharp exhibited several specimens of a weevil, *Ectopsis ferrugalis*, the ends of the elytra of which bore a close resemblance to the section of a twig cut with a sharp knife. He said he had received the specimens from Mr. G. V. Hudson, of Wellington, New Zealand, who stated that they were found resting in large numbers on dead trunks and branches of *Panax arborea* in the forests. Mr. G. C. Champion stated that the species of *Forficulidæ*, captured by Mr. J. J. Walker, R.N., in Tasmania, and exhibited by himself at the meeting of the Society in April last, was, he believed, referable to *Anisolabis tasmanica*, Bormans, described in the 'Comptes Rendus' of the Ent. Soc. Belgique, 1880, p. lxxviii. The Rev. A. E. Eaton made some remarks on the synonymy of the *Psychodidæ*, and stated that since August, 1890, he had identified all of the British species in Mr. Verrall's list, except *Sycorax silacea*. Mr. Gervase F. Mathew, R.N., communicated a paper entitled "The Effect of Change of Climate upon the Emergence of certain species of Lepidoptera." A discussion followed, in which Mr. Stainton, Mr. Barrett, Dr. Sharp, and Mr. McLachlan took part.—H. Goss, *Hon. Sec.*

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—Sept. 24th, 1891, W. H. Tugwell, Esq., Ph.C., President, in the chair. Mr. South referred to Mr. Weir's remarks, at the previous meeting, on specimens of *Arctia caia*, L., with black antennæ, and exhibited two specimens from Mr. Leach's collection,—one English, the other from Japan, both having blackish antennæ. Mr. Tugwell also exhibited two examples from his series. Mr. C. G. Barrett pointed out that in none of the specimens did he consider the antennæ could be described as black. Mr. D. J. H. Carpenter exhibited very blue female forms of *Lycæna icarus*, Rott., from Sussex. Mr. Barker, a specimen of *Leucania albipuncta*, H., taken at Folkestone during August. Mr. Jenner Weir, a specimen of *Bombyx mori*, L., bred from a cocoon found by him on a mulberry tree in his garden at Beckenham, and stated that, although he had made every possible enquiry, he could not learn that anyone in the neighbourhood had been rearing the species. Mr. Tugwell and Mr. South both remarked on the wings of the specimen being fully developed, Mr. South adding that in Japan there were two forms of the species, a domestic one and a wild one, and it was possible that some one might have been rearing this wild form. Mr. Tugwell, specimens of *Epinephile tithonus*, L., with three distinct ocelli on each of the superior wings. Mr. Tutt remarked that he had recently recorded this form. Mr. Frohawk had noticed it at Chattenden, Mr. Carrington in Essex, Mr. Hawes had received it from Devon and Norfolk, Mr. Briggs had taken it at Wandsworth and Wimbledon. Mr. C. J. Barrett said that although he had examined large numbers of the species in

Pembrokeshire, he had never found any specimens so strongly marked as were those of Mr. Tugwell. Mr. R. Adkin exhibited species bred from larvæ received from Forres, together with southern examples, for comparison, and made remarks thereon; he also exhibited a specimen of *Cabera pusaria*, L., in which the first and central lines were very close together, a feature regarded as indicating the form *C. rotundaria*, Haw.; and some observations were made relative to this last exhibit, reference being made by Mr. C. G. Barrett to the series bred by Mr. Atmore, in which he had got every intermediate form between the two, one specimen being *pusaria* on one side and *rotundaria* on the other. Mr. C. Fenn exhibited *Calymnia diffinis*, L., varieties of *Agrotis exclamationis*, L., *Dasypolia templi*, Thnb., a very small dwarf form of *Melanippe fluctuata*, L., and a long bred series of *Cidaria truncata*, Hübn., with the three parent females, and remarked that all the ova were laid within a few days of each other, but there was an interval of seven weeks between the emergence of the first and last specimens, while a portion of one brood was now preparing to hibernate. Some discussion took place on the characteristic distinctions between this species and *C. immanata*, Haw. Mr. J. R. Billups, a specimen of *Deilephila capensis*, one of three said to have been captured at sea, 472 miles from land. Mr. C. A. Briggs, two varieties of *Melitæa aurinia*, Rott. Mr. Carrington, the so-called Grouse Fly (*Ornithomyia avicularia*, L.), and remarked that this winged parasite was not confined to grouse, being found on partridges, woodpeckers, starlings, rooks, and many other birds. Mr. H. Moore, a series of both the red, and blue-winged forms of *Edipoda fasciata*, Fisch., from Trocadero, near Cadiz, and remarked that the species was very conspicuous on the wing, but when at rest was difficult to detect, owing to their resemblance to the soil. Mr. Jenner Weir made some remarks upon this exhibit. Mr. Carrington made some observations on a visit to Skegness. Mr. E. Step read a list of Fungi noted at the Society's outing to Ashstead on the 19th inst.

Oct. 8th. — The President in the chair. Mr. Walter Smith, of Teddington, was elected a member. Mr. Tugwell exhibited *Agrotis agathina*, Dup., and *A. strigula*, Thnb., southern and northern forms; also *Noctua castanea*, Esp., from Perthshire, and the var. *neglecta*, Hb., from the New Forest, Hants. Mr. Tugwell, on behalf of Mr. Boden, exhibited a specimen of *Prodenia littoralis*, Boisd., bred from a tomato; the pupa-case was also shown. Mr. South remarked that the species was fairly common in India. Mr. Jäger, *Callimorpha hera*, L., and var. *lutescens*, L., bred from ova; also *Agrotis ripæ*, Hb., bred from larvæ taken on the Essex coast; some of the specimens were very light. Mr. West, a variety of *Catocala nupta*, L., taken at Streatham, having the inferior wings streaked with yellow. Mr. H. J. Turner, *Zygæna meliloti*, Esp., from the New Forest, taken this season, and *Xylophasia monoglyphæ*, Hufn., from the North. Mr. A. Robinson, a long and varied series of *Nonagria cannæ*, Och., taken by himself and Mr. Bird in Norfolk; Mr. Robinson remarked on some of the specimens, which were very dark. Mr. C. G. Barrett said the specimens were different from any he had seen from Norfolk. Mr. R. Adkin, *Sesia musciformis*, View., from the Isle of Man and Cornwall, and remarked that those from the former locality appeared to be more robust and more densely clothed with scales than the Cornish specimens. Mr. Adkin also exhibited a male and female specimen of a *Tortrix*, bred from larvæ feeding among the needles of a shoot of Scotch fir that he had received from Tuam, Co. Galway, and which had been described and figured from specimens reared in 1890 under the name of *Tortrix donelana* by Mr. G. H. Carpenter

(Scien. Proc. R. Dublin Soc. vol. vii. p. 2), and read notes, in the course of which he mentioned that the imago appeared to bear a strong resemblance to *T. viburnana*, Fb.; and the larvæ also were very similar. Mr. C. G. Barrett also exhibited specimens of this *Tortrix*, and of *T. viburnana*, and remarked that in his opinion the so-called *donelana* were small specimens of *T. viburnana*. Mr. Tutt said he considered the species to be *Tortrix steineriana*, var. *dohrniana*, of which he had received a series from Herr Hoffman. Mr. Short exhibited long and varied series of *Noctua xanthographa*, Fb., from Hampstead and Folkestone, together with other species from the last-named locality.

Oct. 22nd.—The President in the chair. This was a special meeting for the purpose of considering the amendments to the new Bye-Laws proposed by the Council. Among the more important amendments was one by Mr. Watson and Mr. Winkley to change the name of the Society to the London Natural History Society, the reason being that, although founded as a local Society, it could not now be said to be such, as out of close upon 250 members not quite 100 could be described as South London men. This was opposed, on the ground that the Society was well known by its present name, and a change might not be desirable; the amendment was not carried. Mr. Turner, in introducing an amendment to add to the objects of the Society "the compilation of a Fauna and Flora of the S. Eastern Counties," said this work had long been undertaken by the Society, a considerable amount of money expended, and a quantity of material got together, and yet the Committee appointed in 1885 had let the matter drop. The Treasurer said that recently considerable misrepresentation and some erroneous statements had been made with reference to this matter, the true facts being that three members of the Committee, who really brought the matter forward in 1885, had given £11 for the preliminary expenses, for the purpose of seeing whether it was possible to publish such a work; £10 10s. of this had been spent on the preparation and issuing of a circular, map of the district, and directions for preparing local lists. The Secretary said that after several hundreds of these documents had been issued, he had received five lists, one relating to Mollusca, two to Ornithology, and two to Lepidoptera; the Committee therefore had not seen their way to proceed with the proposed work. The Council proposed some alterations as to the mode of nominating and electing officers, and Mr. Turner proposed an amendment, which was supported by Messrs. Tutt, Hodges, Fenn, and others, the drift of their remarks being that if the Council's suggestions were adopted, the Council would become a close body. Messrs. Adkin, Carrington, Hall, and others spoke against the amendment, to the effect that the arguments brought forward in support thereof were entirely misleading, as the Council's propositions were usual in all other Scientific Societies, and, if adopted, would simply give the Council power to nominate officers for the ensuing year, and so ensure sufficient nominations; if the Society's nominees were objected to, members had the right to make other nominations, and all the officers had to be elected, two ordinary members of the Council not being eligible for re-election within twelve months. The amendment was not carried. Some of the other changes are, that the President shall hold office for one year only, and the annual subscription of future country members to be 5s. The adoption of the Bye-Laws in place of the old Rules was moved by Mr. Barrett, and seconded by Mr. Hall; and the meeting closed with votes of thanks to Mr. Barrett for introducing the Bye-Laws to the Meeting, and to Mr. Briggs for drafting them.—H. W. BARKER, *Hon. Sec.*

LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY.—October 12th, 1891.—The Rev. H. H. Higgins, Vice-President, in the chair. Mr. C. E. Stott read a paper entitled “Notes on *Celæna haworthii*,” in which he described the haunts of this species, cautioning the would-be captor of the necessity of very gently approaching the heather on which the insect rests, otherwise it would take fright and drop to the roots, from which it is almost impossible to extricate it. The author then gave a short history of its earlier stages, and concluded by describing the different local varieties. The paper was illustrated by specimens of the species. Mr. J. Collins read “A few Remarks on *Aplecta nebulosa*,” stating he had bred five melanic forms from Delamere, for which he proposed the varietal name of *robsoni*, in honour of the well-known entomologist, Mr. J. E. Robson, of Hartlepool. Mr. Collins exhibited the five specimens, with others bred at the same time. The Secretary read a communication from Mr. J. W. Tutt, who wrote that the specimens of *Tortrix donelana* exhibited at the last meeting had, at the meeting of the South London Entomological Society, been stated to be *T. steineriana* var. *dohrniana*, and that the name *donelana* would therefore fall to the ground. But it was pointed out that *donelana* had already been referred to *steineriana*, but incorrectly so. Mr. Townsing showed a remarkable gynandromorphous specimen of *Orgyia antiqua*, the head of which possessed the male structure, while the body was that of the female; Mr. Harker a variety of *Vanessa io*, the ground-colour of which was fulvous brown, apparently owing to the thinness of the scales; Mr. Gregson a very variable series of *Dianthæcia conspersa*, including the melanic form; Messrs. Townsing and Prince some dark forms of *Abraças grossulariata*; and Mr. Pierce (the Secretary) *Retinia resinana* and their resinous nodules from the fir trees.—F. N. PIERCE, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—Sept. 21st, 1891.—Mr. R. C. Bradley in the chair. Mr. P. W. Abbott showed *Tæniocampa opima* and *T. gracilis*, and *Nyssia zonaria* from Wallasey; also *Argynnis paphia* var. *valesina* from the New Forest. Mr. G. W. Wynn showed *Sesia culiciformis* from Wyre Forest. Mr. W. Harrison showed a bred series of *Selidosema ericetaria* from the New Forest. Mr. R. C. Bradley showed four specimens of *Pteropæcilia lamed* from Sutton, which he said Mr. Verrall had confirmed. Mr. C. J. Wainwright showed *Plusia orichalcea* and *Arctophila musitorus* from N. Cornwall. Mr. W. Harrison showed a box of beautifully preserved larvæ. He had managed to retain the green colours in *Saturnia carpinii* and others by inflating them and allowing them to dry naturally in cool air, which takes about twenty minutes only.

Oct. 5th.—Mr. W. G. Blatch, President, in the chair. Mr. R. C. Bradley showed a long series of *Spilographa zoe* from Moseley. This species is usually found singly, but Mr. Bradley succeeded in taking it freely from the under sides of leaves at Moseley. Mr. G. W. Wynn showed a box full of large American Bombyces; also *Xylophasia hepatica*, which he had bred from pupæ found underneath the bark of poplars at Cleeve Prior; they were in cocoons and situations which exactly resembled those of *Acronycta megacephala*. Mr. W. Harrison showed *Papilio machaon* from Wicken. Mr. W. G. Blatch showed the following beetles:—*Homalota crassicornis*, from Bewdley; *Oxytelus fulvipes*, *Henoticus serratus* (a series), *Micropeplus tesserula* (a series), and *Lampronia luzella*, all from Knowle.—C. J. WAINWRIGHT, *Hon. Sec.*



• West, Newman lith.

Argyrolepia maritimana, Guen.

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EARLY STAGES OF *ARGYROLEPIA MARITIMANA*, GUEN.

BY GEORGE ELISHA, F.E.S.

PLATE V.

THE egg is, no doubt, laid in the flower-heads of the sea-holly (*Eryngium maritimum*), (fig. 1), and occasionally in the strong flowering side-shoots, about the first week in July, for I have observed traces of the operations of the larva towards the end of the month in a slight discoloration, which gradually extends as the larva works downwards in the stem, till the whole of the immature flower-head becomes withered and brown.

The larva, in many cases, on arriving at the first joint, eats its way out, and crawling down the stem bores a fresh hole under the first joint above the surface of the sand, gradually working its way in and down towards the soft fleshy root (fig. 5a); others mine from the flower-head through the whole length of the stem, which is filled with frass as the larva proceeds. They are all down in the roots by about the beginning of September, and continue mining some considerable distance, in many cases to a depth of six or eight inches below the surface of the sand.

About the first week in October they are getting full grown, and this is about the best time to collect them, for if taken earlier the difficulty of rearing them is so great that it is sheer waste of time to take them, to say nothing of the useless destruction of such a very local species.

The larva (fig. 2) is white, inclining to yellowish, rather transparent looking, with brown head and black spiracles, emitting short hairs, and is about three-quarters of an inch when full grown; it eats out the whole of the interior portion of the soft root, leaving only a thin shell or skin, and remaining in the larva state till the end of March, when they are found working their way up to the top of the root, where they hollow out a sort of chamber; and towards the beginning of May change to the pupa state (figs. 6, 7).

The perfect insect (fig. 3) emerges about the second week in June, leaving the pupa-case sticking out of the crown of the root (fig. 4). They appear very sluggish, crawling to the top of the stems and remaining in the same position for a day or two; if disturbed they seldom attempt to fly, but run about on the surface of the sand, up another stem, and settle down quietly. The larvæ are very subject to ichneumons, of which considerably more are bred than moths; the name of this parasite, I am informed by Mr. Bridgman, of Norwich, is *Glypta rubicunda*, n. sp., a species of Ichneumonidæ new to science.

I have found the larvæ on various parts of the Essex coast, where the food-plant was growing, and have searched well along the coast from Deal to Sandwich (its old locality), but the *Eryngium* seems to have almost disappeared from that particular spot, so that my search there has proved fruitless.

In collecting these larvæ it is most important to get up the long pipe-like roots (fig. 5), without injuring the mined portion, with about two or three inches of sound root beyond the mine for the larva to continue feeding in till it is full grown. The roots are very brittle, about the size of an ordinary lead-pencil, some slightly larger, of a light brown colour, and penetrating deep into the sand, the mined portion becoming black and discoloured, very soft, and soon injured, so that the sand must be carefully scraped away from the roots affected till the end of the mined portion is reached; and as this necessitates digging down eight or ten inches, it is rather wearisome work, often ending in disappointment, for if the mined portion is wet and flabby the larva will be found dead in the mine.

As there is considerable risk in opening the mined roots to examine them, it is best to take all those that appear to contain larvæ and place them upright in sand, imitating nature as near as possible. But they are difficult to breed; at least such is my experience, for I have never bred more than one or two insects out of every dozen mined roots collected, caused, no doubt, by so many of the roots dug up containing larvæ killed or stung by ichneumons; and, again, by the very different conditions one is obliged to adopt in rearing them away from their native habitat.

Shepherdess Walk, N.

INSECT PIGMENTS.

By T. D. A. COCKERELL, F.Z.S.

In the final part of his valuable series of papers on Insect Colours, Mr. Coste devotes two pages (Entom. 209-211) to discussing and disproving a supposed hypothesis of mine that the evolitional order of colours was yellow, white, red; white being developed from yellow, and red from white! This has so

astonished me, that I have looked at everything I ever wrote on the subject* to see if anywhere there is a reference to the origin of red from white, or indeed from any colour but yellow. As I fail to find such reference, and do not remember ever having entertained such an idea, I cannot but conclude that Mr. Coste has attacked a theory which had no existence until it was set up to be overthrown in Entom. p. 209!

However, I *did* at one time suppose that white had arisen from some yellow pigment, just as red had. At that time I was not aware of the physical (non-pigmental) nature of at least the vast majority of whites, and erred accordingly. But I indicated the probable error of my first impressions, and pointed out the difficulties besetting the question in Entom. 1889, p. 126, before Mr. Coste began to write his papers.

So far as Mr. Coste's main contentions go, I have indeed "long since been convinced," for they agree very well with much that I had myself imagined, and duly set forth, in 1887. But of course I am far from denying the value of Mr. Coste's work. Anybody may speculate, as I did, on the course of evolution, but such speculations are chiefly useful if they lead to detailed observation and experiment, whereby the real facts are ascertained. Even the discussion of my imaginary theory is most instructive, and Mr. Coste's summary of results is full of suggestions for future investigations. In the future, our knowledge of the nature of insect pigments ought to grow rapidly. Some of the varieties predicted by Mr. Coste, on pp. 207, 208, are already on record,—how many I cannot now say. *Chærocampa porcellus* has a form in which pink is replaced by yellow. *Anthocharis cardamines*, male, with the orange only on the right wing, is recorded in Entom., 1879, p. 181. A yellow var. of the female *Tortrix viridana* is known: see Dr. Chapman, Ent. Rec., 1890, p. 177. *Vanessa urticae*, pale yellow var., is recorded in Ent. Rec., 1891, p. 10. *Epinephele tithonus*, pale or "bleached" forms, are recorded in Entom. xi. 229; xvi. 234; xix. 230. For a red var. of *Arctia villica*, see Entom., 1889, p. 2.

Institute of Jamaica; Kingston, Jamaica, Sept. 20, 1891.

* It would be useless to repeat here the statements that I have already made in print; but in case anyone should care to look them up, here is the list of references:—

(1.) The relation of red to yellow. Proc. S. Lond. Ent. Soc. for 1887, p. 45, and pp. 101-103 (detailed discussion); Entom., 1887, p. 151; Ent. News, 1890, p. 4.

(2.) Orange and yellow. Entom., 1888, p. 189.

(3.) White and yellow. Proc. S. Lond. Ent. Soc. for 1889, p. 139; Entom., 1888, p. 113; Entom., 1889, p. 126.

(4.) Red, yellow, and white. Proc. S. Lond. Ent. Soc. for 1888, p. 57 (see also Ent. Rec., 1890, p. 57).

(5.) Pallid and albino forms. Proc. S. Lond. Ent. Soc. for 1887, p. 100 (attributed to arrest in development); Entom., 1889, p. 4, and as to pallid females, p. 5.

A PRELIMINARY LIST OF THE INSECT-FAUNA OF MIDDLESEX.

COMPILED BY T. D. A. COCKERELL, F.Z.S., F.E.S.

(Continued from p. 160.)

SHORTLY before leaving England I received three lists of Lepidoptera, containing many interesting records, as follows:—

(26.) H. Vaughan. A MS. list of Lepidoptera taken in Middlesex north of London, within six miles of Charing Cross. These insects were nearly all taken by Mr. Vaughan, Dr. H. Guard Knaggs, or Mr. Henry Bartlett. Many of the localities are now destroyed. This valuable list includes localities for many rarities, and the following species additional to the published lists:—

Pararge egeria, L., Hornsey (Vaughan).

Nudaria senex, Hb., Hammersmith Marshes (Knaggs).

Drepana falcataria, L. (as *P. falcula*), Bishop's Wood, Hampstead (Bartlett).

Notodonta dromedarius, L., Bishop's Wood (Bartlett).

Cymatophora or, Fb., Bishop's Wood (Vaughan).

Leucania obsoleta, Hb., Hammersmith Marshes (Knaggs).

Neuria reticulata, Vill. (as *saponariæ*), Bishop's Wood, one in 1865 (Vaughan).

Grammesia trigrammica, Hufn. (as *trilinea*), vars. *bilinea*, Hb., and *semifuscans*, Bishop's Wood (Vaughan).

Agrotis exclamationis var. *plaga*, St., Bishop's Wood (Vaughan).

Aplecta occulta, L., field adjoining Maldon Crescent, one specimen about 1860 (Knaggs). *A. tincta*, Brahm, Hampstead (Knaggs).

Concerning *Leucophasia sinapis* Mr. Vaughan writes: "The late Col. C. J. Cox informed me that when he was a boy he had captured examples in Bishop's Wood."

(27.) H. Rowland-Brown. A MS. list of Noctuæ observed at Harrow Weald, Middlesex. The following species are additional to the published lists:—

Miana literosa, Haw., quoted with a query.

Polia chi, L.

Trigonophora flammea, Esp.

Hadena adusta, Esp.

The total number of Noctuæ in this Harrow-Weald list is 73.

(28.) J. M. Adye. A MS. list of Lepidoptera taken at Ealing and Willesden. The two following are additions to the lists given:—

Bombyx quercus, L., near Ealing. This species was quoted for Middlesex with a query on p. 68.

Dasypolia templi, Thnb., one at Ealing.

LEPIDOPTERA.

Noctuidæ subfam. *Xylininæ*.

Xylocampa areola, Esp. (*lithoriza*, Bork.), Mill Hill, at sugar, also bred (*South*); Hampstead Heath, 1887 (*Watts*); Harefield, once (*Wall*); Harrow-Weald (*Rowland-Brown*).

Calocampa vetusta, Hb., Mill Hill, at sugar (*South*). *C. exoleta*, L., Mill Hill, at sugar (*South*); Isleworth (*Meyers*); Bishop's Wood, Hampstead (*H. Bartlett fide Vaughan*); Harefield, sparingly (*Wall*).

Xylina semibrunnea, Haw., Mill Hill, one at sugar (*South*); Harefield, two (*Wall*); Harrow-Weald (*Rowland-Brown*); Ealing, one (*Adye*). *X. ornithopus*, Rott., Brook Green, Hammersmith (*Tarbat*).

Asteroscopus sphinx, Hufn., Harefield, a few taken most years (*Wall*).

Cucullia umbratica, L., Hampstead Heath, Clutterhouse Lane, Old Oak Common, on palings (*Godwin*); Chiswick (*Sich*); Harefield, 1885 (*Wall*). *C. verbasci*, L., Harefield, larvæ common on *Verbascum* in garden (*Wall*). *C. chamomillæ*, Schiff., Chiswick, once at rest on a paling (*Sich*); Regent's Park (*F. Bartlett fide Vaughan*).

Subf. *Gonopterinæ*.

Gonoptera libatrix, L., Mill Hill, at sugar, also bred (*South*); Chiswick, larvæ on willow and balsam (*Sich*); Bedford Park (*Fenn*); Isleworth (*Ckll.*); Hampstead (*Vaughan*); Harefield, generally common (*Wall*); Harrow-Weald (*Rowland-Brown*); Hammersmith (*Mera*); Clapton (*C. Carter fide Bacot*); Bloomsbury (*British Museum*).

Subf. *Plusiinæ*.

Habrostola tripartita, Hufn. (*urticæ*, Hb.), larvæ out of nettles, Clutterhouse Lane, commonly (*Godwin*); Mill Hill (*South*); Maldon Crescent (*Knaggs fide Vaughan*); Harefield, occasional (*Wall*). *H. triplasia*, L., larvæ out of nettles, Clutterhouse Lane, rare (*Godwin*); Chiswick, common (*Sich*); Isleworth (*Fenn*); Kentish Town, 1860-65 (*Vaughan*); Maldon Crescent (*Knaggs fide Vaughan*); Highgate Woods (*Shepherd*); Hammersmith (*Mera*); Clapton (*Bacot*); Tottenham (*Prout*).

Plusia chrysis, L., Clutterhouse Lane, Old Oak Common, West Hampstead (*Godwin*); Mill Hill, netted at dusk amongst nettles (*South*); Chiswick, at flowers of *Ballota nigra* (*Sich*); Bedford Park (*Fenn*); Isleworth (*Miss K. Fenn*); South Hampstead (*Watts*); Highgate (*Vaughan*); Harefield, frequent (*Wall*); Finchley (*Shepherd*); Harrow-Weald (*Rowland-Brown*). *P. iota*, L., Clutterhouse Lane, larva on nettle, rare (*Godwin*); Mill Hill, netted at dusk amongst geraniums (*South*); Hampstead Heath (*Watts*); Bishop's Wood (*Vaughan*); Harefield, once (*Wall*); Harrow-Weald (*Rowland-Brown*). *P. gamma*, L., generally dis-

tributed (*Godwin*); Mill Hill, netted at dusk amongst geraniums (*South*); Chiswick, abundant (*Sich*); Bedford Park (*Miss E. Sharpe*); Isleworth (*Fenn*); common (*Watts*); everywhere (*Vaughan*); Harefield (*Wall*); Tufnell Park (*Shepherd*); Harrow-Weald (*Rowland-Brown*); Hammersmith (*Mera*); Clapton (*Bacot*); Dalston (*Prout*). *P. pulchrina*, Haw., Chiswick, once in a house (*Sich*); Harefield, once (*Wall*); Harrow-Weald, common on geraniums (*Rowland-Brown*). *P. festuæ*, L., Clapton (*Bacot*).

Subf. *Heliothinæ*.

Heliaca tenebrata, Scop. (*arbuti*, Fb.), in hay meadows in many places (*Godwin*); Mill Hill, plentiful on the common, several in the orchard (*South*); West Hampstead (*Watts*); fields at Finchley side of Bishop's Wood (*Vaughan*); Harefield, one, 17th May, 1890 (*Wall*); Highgate Woods (*Shepherd*); Old Oak Common (*Mera*); plentiful at Willesden (*Adye*).

Heliothis peltigera, Schiff., see 'Naturalist,' 1885, p. 347.

Poaphilidæ.

Phytometra viridaria, Clerck., "Isleworth" (*Meyers*, reported to *F. Fenn*).

Euclidiidæ.

Euclidia mi, Clerck., Old Oak Common (*Godwin*); Mill Hill, several on the common (*South*); Ruislip and Pinner, 10th June, 1883 (*Watts*); Harefield, moderately common (*Wall*); Harrow-Weald (*Rowland-Brown*); plentiful at Willesden (*Adye*). *E. glyphica*, L., Pinner Woods, 3rd June, 1883 (*Watts*); Harefield, common (*Wall*); Harrow-Weald (*Rowland-Brown*).

Catocalidæ.

Catocala nupta, L., Hampstead Heath, Regent's Park, Hyde Park, Maida Hill, &c. (*Godwin*); Mill Hill, at sugar (*South*); Chiswick (*Sich*); Bedford Park (*Miss E. Sharpe*); Isleworth (*Meyers*); Kentish Town, Highgate (*Vaughan*); Harefield, taken freely, especially in 1887 (*Wall*); Harrow-Weald (*Rowland-Brown*); Hammersmith (*Mera*); Ealing (*Adye*); Clapton (*Bacot*); Bloomsbury (*British Museum*).

C. fraxini, L., Regent's Park (*Knaggs*, Ent. Ann. 1871).

Boletobiidæ.

Boletobia fuliginaria, L., Thames Street, London (*Wellman*, Entom. 1879, p. 225).

Herminiidæ.

Rivula sericealis, Scop., Harefield, common (*Wall*).

Zanclognatha nemoralis, Fb. (*grisealis*, Hb.), West Hampstead, common, Clutterhouse Lane (*Godwin*); Bishop's Wood, Highgate Wood (*Vaughan*); Harefield, not common (*Wall*).

Z. tarsipennalis, Tr., Bishop's Wood, Highgate Wood (*Vaughan*); Tottenham (*Prout*).

Pechypogon barbalis, Clerck, Bishop's Wood (*Shepherd*).

Hypenidæ.

Hypena rostralis, L., Bishop's Wood, Hampstead, West Hampstead (*Godwin*); Isleworth (*Ckll.*); Bedford Park (*Ckll.*); Highgate (*Vaughan*); Finchley (*Shepherd*). *H. proboscidalis*, L., Bishop's Wood, Old Oak Common, Clutterhouse Lane, Kingsbury (*Godwin*); Hampstead, Kentish Town (*Vaughan*); Harefield, very common (*Wall*); Finchley (*Shepherd*).

NOTE.—On p. 121, the locality for *Senta maritima* is omitted; it is Hammersmith Marshes (*Newman*). On p. 158, the footnote on *P. rubricosa* should be erased, as Dr. Chapman has well shown (*Ent. Rec.* 1891, April, p. 13) that this insect is not a *Tæniocampa*.

Institute of Jamaica; Kingston, Jamaica, Oct. 3, 1891.

(To be continued.)

REARING LIMENITIS SIBYLLA AND PARARGE EGERIA.

By J. H. FOWLER.

OF all our forest Rhopalocera, *Limenitis sibylla* is deservedly considered one of the most interesting and beautiful in its metamorphoses. Perhaps a few hints to amateurs who desire to obtain and breed it may be acceptable, especially as many who have taken the imago have never seen the species in either of the other stages; yet it is conspicuous, and easily found in any stage.

The locality where I obtain *L. sibylla* commonly every season is in the Linford enclosures, near Ringwood, which were planted about forty-five to fifty years ago, trees of that age being very suitable for the growth of the larval food-plant, the common honeysuckle. You will observe the latter twining itself upon the oaks, and sending graceful sprays to within a foot of the ground; it is in such positions I recommend searching; select plants of scanty growth; the thicker bushes are not so productive, and searching is better than beating in many respects.

The ova are deposited upon the upper edges of the leaves, and at times upon the leaf-stalk, during July; the larvæ hatch in about sixteen days and feed for a very short time before hibernating. I have never yet found a larva in winter quarters, but imagine it hibernates upon the extreme ends of the twigs, as I find in June it commences eating at the terminals and works upwards, and, by observing the bare branches, can usually detect its presence.

The larvæ when small are rather delicate, and not easily reared; the best time to collect them is from the 7th to the end of June, especially as the month advances, when they can be readily seen at a distance of several feet, and, by careful searching, the pupa can often be found spun up underneath the leaves. I have never observed the larvæ upon plants growing upon the ground, nor above eight or nine feet high.

The result of my last season's collecting has produced me above fifty perfect specimens (one slate abn.). I may add that great care must be taken to keep the pupæ suspended, otherwise cripples may be expected.

There is every prospect of *L. sibylla* being abundant next season, as I have seen the ova in profusion, some leaves having three and four upon them; and, as I did not breed a single parasite, it would seem to be a species pretty free from the attacks of such enemies, at all events in this locality.

I have refrained from describing the ova, &c., scientifically, as the earlier stages of the species appear to be well known; confining myself to the general habits of *L. sibylla* for the information of those who may wish to study for themselves its life-history.

Since writing the above a thought struck me that by careful searching I might possibly discover the larva hybernating; so with that intention I went to the Linford enclosures, and examined honeysuckle plants, where I had previously seen some ova, the result being that I found four larvæ within half an hour, which number was quite sufficient for my purpose.

The larva, which at this age is superficially very like that of *Argynnis selene*, is about an eighth of an inch long, and exactly the colour of the bark of the honeysuckle; it has a pale stripe running along each side, and, excepting in the matter of colour, I do not see the least difference from a full-grown larva, the spines, &c., corresponding.

The larva prepares a very secure winter retreat, which doubtless it constructs on the same leaf it was hatched upon. I was right in surmising twig-ends as its position. Small as it is, it has the power of spinning a very tough web, this being necessary, as its existence for some eight months is almost in mid-air, and exposed to all kinds of weather.

It hibernates upon the midrib of the upper surface of the leaf, which is attached to the main twig by a very thick and tough layer of silk, the leaf being neatly folded over from the centre, and well lined for a short distance; but the portion which is not thus treated soon decays and falls off; so in reality the whole structure is not more than half an inch long; it is tent-shaped and partially suspended, the end nearest the leaf-stalk is securely closed, whilst the other has a very small opening, close to which is the head of the larva, as it hibernates with its head towards the ground.

Upon several occasions I have looked for this larva hibernating, the reason of my non-success being that I have always searched large dead leaves that remain in such plenty about the plants, and overlooked the small and inconspicuous, but, in this connection, important portions of the plant.

Pararge egeria is one of the most abundant of the "browns" seen in the New Forest, and always to be met with in good or fair condition from April to the end of September; it is triple-brooded, and, like most species of the Satyridæ, can be easily induced to oviposit in confinement.

Procure females, and place two or three into a wide-mouth bottle containing a few blades of coarse grass, cover over with white muslin, and place the bottle in a window-sill facing the south, and within a week plenty of ova will be the result: of course, the more females kept the better, as it insures a greater number of eggs; when you have ova in plenty, remove them into a small glass, and as the larvæ emerge place them in bottles, and feed every evening with fresh grass cut up into small strips. It is surprising with what ease this species is brought to maturity.

The following notes I think will interest some entomologists, as by rearing and observing *P. egeria* I have seen it as an imago alive for twelve consecutive months, and, so far as my experience goes, it is the only British butterfly that has been seen under such circumstances; none of the Pieridæ act so, although it is well known that some of its members emerge early in the year. Undoubtedly *egeria* is a satisfactory species to rear.

In August, 1890, I secured a nice lot of females, also a few in the middle of September, from which I obtained ova in abundance, which finally produced perfect insects on the following dates, viz.:—Oct. 24th to 31st, 4 males; Nov., 3 males and 4 females; first females, after which time it is not worth while giving number in sexes; Dec., 7; Jan. (1891), 4; Feb., 10; March, 16; three pupæ remaining, which I preserved; at the end of April I saw specimens in the Forest, and commonly in each succeeding month to end of September, thus completing the year. The latest date I have seen it in nature was Nov. 2nd, 1887, a perfectly fresh male.

Several of the pupæ were brown, instead of the usual light green. I bred a few striking examples: one male with all the pale spots replaced with tawny, another almost unicolourous dark brown, and several very fully developed females.

I am now breeding a number of *P. egeria*, also *P. megæra*; the former is very late this season, as they have only just begun to pupate (Nov. 6th), quite the reverse of last year. Of *P. megæra* several are in pupæ, and are mostly of the black form*; I think this strange, as I bred above twenty last year, but they were all green, and it is a curious fact that all emerged by the end of

* See Entom. 195.—Ed.

October; I expected a few to lie over until the spring. I cannot see why the pupæ should be black, as no difference in the larvæ was exhibited. I am feeding them up in a room which is heated from 8 a.m. to about 11 p.m., and under exact conditions of those I reared last season.

Ringwood, 7th Nov., 1891.

NOTES FROM CHESHIRE AND NORTH WALES.

By J. ARKLE.

CONTINUING my notes from the catkin season (Entom. 143—145), May can be briefly described this year as a cold month, in which, with the exceptions of larvæ of *Odonestis potatoria* and *Arctia caia*, and an occasional sight of imagines of *Spilosoma menthastri*, I saw little that was entomological out-of-doors. The usual May storm occurred about the customary period, viz., on the 16th and 17th, when the Welsh hills were white with a general snowfall, and people in the streets might be heard jocularly wishing each other a merry Christmas. June kept up the character of a cold summer (see Entom. 126). Larvæ of *S. menthastri*, obtained at Aberdovey in the preceding July, began to appear as perfect insects on the 13th. These included the variety with soot-coloured tips to the upper wings,—all, be it remembered, from the same batch of eggs.

On June 13th I went to Delamere Forest, in search of two species of dragon-flies, and was successful. No. 1: Head, eyes, thorax, and body bronze-blue, segmental divisions of body sky-blue—*Agrion puella*. No. 2: Head, eyes, and body ruby-red; thorax, with dorsal surface, metallic dark green—*Agrion minium*. In both species the colours are permanent, the bodies slender, and about an inch and a quarter long. Each wing bears the usual dark spot on the costal margin near the tip. This spot is much darker (black) in the case of *A. minium*. I then went to Oakmere, intending to hunt for another species on the west side of the lake. In my wanderings and digressions I forgot to steer, and so found myself on the east side. But what a lovely scene! sylvan shades and grassy hillocks, on which the blue of the wild hyacinth dominated the grassy-green stretches of heather—here a long point of land reaching into the placid lake, and yellow with a short, thick carpet of golden broom—sedges, bulrushes—a wooded island far out in the centre—and pine trees circling round the lake, sheltering many an uncouth bird, strange insect, and lovely flower! Up started a dragon-fly, and at last I secured two specimens. Briefly described, the head, thorax, and body are brown, the tint being deepened to very dark brown at the head and anal segments. The wings have a brown shade, and,

in addition to a very conspicuous dark brown costal spot near the tip, there is, midway on the costal margin of each wing, another still more pronounced dark brown blotch. The base of each lower wing is further ornamented with a large triangular patch of the same dark brown as the costal spots, but delicately reticulated with pale grey. The body is stout, and an inch in length. This fine dragon-fly is *Libellula quadrimaculata*.

In the Forest I came across the usual common insects—*Ematurga atomaria*, *Bupalis piniaria*, *Melanthia ocellata*, *Melanippe sociata* (*subtristata*), *Cabera pusaria*, *C. exanthemata*, *Panagra petraria*, *Macaria liturata*, *Thera variata* var. *obeliscata*, and a fine specimen of *Hylophila prasinana*, just emerged from the chrysalis. What I specially wanted in Lepidoptera, however, was *Tephrosia biundularia* var. *delameriensis*, and I secured half a dozen good specimens off the oak-trunks. The females obliged me with several batches of eggs, some of which were sent off to entomological friends, and I reared a considerable number of larvæ, which began to pupate on August 9th.

On June 20th a lot of *Mamestra brassicæ* I had bred up from the egg in the summer of 1890 for observation began to show themselves. About a dozen moths appeared from the same brood on Sept. 11th, 1890, and in the two or three following days. The rest lay over the winter, and appeared as perfect insects between June 20th and July 17th. These I simply turned out of the flower-pots as they emerged, thinking they would take themselves off at the approach of nightfall; but they laid their eggs first, and the consequence was that the few green things I can grow out-of-doors were attacked by a host of the caterpillars, mint and French and African marigolds being especially selected. I also bred from the egg a batch of *Noctua augur*, the caterpillars of which hybernated through the winter, and appeared as imagines by July 12th. The eggs of these insects, seen through a powerful microscope, are a sight worth remembering, especially those of *M. brassicæ*, with their irregular, blotched, purple band, and ribbed shell as of dull white china.

July was a cold wet month, so cold and wet that collecting was almost impracticable.* A lot of *Bombyx neustria* began to show themselves in the breeding-boxes on the 17th. The larvæ were kindly sent me by Mr. W. J. Kerr, who came across them in considerable numbers at Barmouth in June. This is a new insect to our district list. On or about this date I sacrificed my small number of bred *Agrotis ashworthii* in obtaining ten eggs, which turned out infertile. This experiment I am not likely to repeat. July 19th: *Dianthœcia capsicola* (larvæ taken at Aberdovey, July, 1890) began to appear. I only bred two specimens, as I failed to find *Silene inflata* in this neighbourhood for the

* I tried sugaring for two or three nights, but as the result was nothing but snails, slugs, and earwigs, I gave it up.—J. A.

caterpillars.* Curiously enough, on July 28th of this year, I discovered a liberal supply of the plant in the district known as Sealand (land reclaimed from the tidal Dee), and within three miles of Chester. This welcome acquaintance led to fresh discoveries, and I obtained, I believe, no less than four different species of larvæ (nearly full-fed) from the capsules—*Emmelesia decolorata*, *Eupithecia venosata*, *D. carpophaga*, and *D. cucubali*. The most curious thing in this curious season has been the free occurrence of really good larvæ. *Bombyx rubi*, *B. quercus*, and *S. fuliginosa*, in the larva-state, have been abundant in the Isle of Anglesey, and, close to Chester, I more than once came across caterpillars of *Smerinthus ocellatus*, *Dicranura furcula*, *D. bifida*, and *D. vinula*—the latter frequently—while I never remember seeing such numbers of *S. populi*.

On Aug. 8th, a dull, cold day, I went to Delamere Forest. Lepidoptera were scarce, except *C. populata*, fresh from the chrysalis, which rose from the ferns as I brushed through them; and the pretty "cowslip-yellow" *Xanthoetia hamana*. Oak-beating was a failure, but from birch I got larvæ of *Acronycta leporina*, *A. psi*, and *Tæniocampa stabilis*. I bred a large number of the last-named larvæ from moths taken in the spring, as the insects show considerable variation in the general colour of the wings; but the caterpillars exhibited a very close resemblance to each other. I also took a strange, dull green caterpillar off bilberry, with dark, smoky green V-shaped marks on each segment. Growing out of a hedge in the village, I was surprised to find a solitary plant of *Silene inflata*. Rain came on early in the afternoon, and put a stop to further work.

On Aug. 9th, a male *B. quercus*, var. *callunæ*, in which I understand the interior dark brown of the lower wings ends in a curved point on the anal angle, emerged from a larva brought to me in June. Another caterpillar received at same time spun up August 27th, and is now lying over the winter.

On Aug. 29th, a search for larvæ on the willows, &c., in Caughall Lane—my chief hunting ground in the spring—proved a failure. I was rewarded, however, with a nice series of *Ephippiphora populana* (*ephippana*), a beautiful little Tortrix with dark purplish upper wings ornamented with a conspicuous, central, cream-coloured blotch.

In September I was much away from home; but on the 5th I again visited Delamere, and beat larvæ of *Lophopteryx camelina* (abundant this year), *Drepana falcatoria* (*falcula*), *Notodonta dromedarius*, *Dasychira pudibunda*, and *Amphidasys betularia* from oaks and birch. My special object was to beat larvæ of *Hadena adusta* for a correspondent, off bog-myrtle, on Hatchmere Moss; and, in spite of the fire which apparently exterminated many species here two years ago, I succeeded. Larvæ of *H.*

* These larvæ will eat seed-capsules of pinks and sweet-williams.—Ed.

rumicis and *H. pisi* fell freely into my umbrella as well, but no *Nemeophila russula*! Two years ago I beat the latter into the umbrella by the half-dozen. The day was dull and threatening, but a fine specimen of the dragon-fly, *Libellula scotica*, fell into the umbrella from the sweet gale (bog-myrtle). The following is a description:—Expanse of wings, 2 in.; body, from thorax, 1 in., and slender. Head yellow; eyes brown. Thorax and body yellowish ochreous brown, black underneath. Legs black. A dark, almost black, triangular frontal mark on thorax; sides of thorax light yellow, with black boundaries and centres. Wings colourless, except the base, which is suffused with yellowish ochreous colour; a black, rectangular costal mark near each tip; nervures delicately pencilled in black. The only lepidopterous insects I could beat up on the Moss were *C. testata*, and a few faded *Crambus margaritellus*.

In early September and late August I found larvæ of *Orgyia antiqua* a pest in the Grosvenor Park, Chester. Some of the bushes of the holly-leaved barberry (*Mahonia aquifolia*, American flora) had scores and hundreds of them, together with cocoons and pupæ. I bred a large number of the moths, and it was amusing to see out-of-door males assembling in the daytime on the breeding box when the females appeared.

On Sept. 7th, a fine but unusually pale larva of *A. alni* was brought to me for identification by Mr. J. Lyon Denson, a Chester fellow-naturalist. It had been taken off a brick wall, in the suburbs, by a boy. In spite of diligent search, no more were to be had. On Sept. 8th Mr. Denson and I worked the gas-lamps with a ladder. We took several *Eugonia alniaria* (*tiliaria*), *C. truncata* (*russata*), with vars. *perfuscatata* and *immanata*, *Crocallis elinguaris*, a fine *Geometra papilionaria*, *Noctua rubi*, *Neuronia popularis*, *Triphæna ianthina*, *Hydræcia micacea*, and other common moths. We had now a few days of hot weather, and the butterflies, as if determined to share them, appeared in fair numbers; *Pieris brassicæ*, *Epinephele tithonus* (very late), with small coppers and common blues. I saw nothing of *Vanessa urticæ*, *V. io*, or *V. atalanta*, although I found larvæ of the first two common enough on nettles by the river-side, in July.

On Oct. 3rd I went to Delamere Forest, chiefly to get rid of a "cold," possibly influenza. Experience showed me that the odour from the firs is most beneficial in such cases. Making every allowance for "faith-healing," if there be such a thing, I was better next day, and thoroughly well the day after. Beating Scotch firs showed larvæ of *B. piniaria* to be in force, while those of *L. camelina*, full-fed, still lingered on birch. But the ferns and undergrowth were rapidly turning yellow, showing up, in startling contrast, the greens of the mosses and the sombre shades of the Scotch firs. We had, generally speaking, a cold, wet October, with high gales; and I packed away my setting-

boards, thinking collecting was over for the year. The night of Nov. 2nd, however, tempted me to try the gas-lamps again; and, to my surprise, I took four *Miselia oxyacanthæ*, a moth I never saw before in the district, although it is marked "common" on the list; five *Himeria pennaria*, two *Diloba cæruleocephala*, one *Asteroscopus sphinx* (*cassinea*), and one *Calymnia pyralina*, all in capital condition. *Cheimatobia brumata*, *Hybernia defoliaria*, *Oporabia dilutata*, and *Anchocelis pistacina* were also well represented. The nights of the 3rd, 6th, and 7th saw me at the lamps again, of course with a ladder, when all the insects just mentioned occurred freely, with the exceptions of *M. oxyacanthæ* and *A. pistacina*, which disappeared on the 7th. The weather broke up again on the 8th, with storms of wind and rain; and to-night, as I write, it is difficult to believe I was moth-catching only a few hours ago.

Chester, Nov. 9, 1891.

CURE FOR THE RAVAGES OF THE LARVÆ OF *NEMATUS RIBESII* AND *ABRAXAS GROSSULARIATA*.

IN the interesting lecture delivered this month by Mr. G. C. Bignell, F.E.S., before the members of the Plymouth Institution, on "The Hessian Fly and other Insects injurious to Farm and Garden Produce," he mentions those two pests, *Nematus ribesii* and *Abraxas grossulariata*, which attack the currant and gooseberry bushes. The larvæ of the latter have been most abundant this season, and many are the loud and deep complaints I have heard from neighbours.

It may interest your readers to hear of an effectual remedy which does not seem generally known, judging from my experience. I first saw it used in Lanarkshire, where large quantities of small fruit are grown for jam-making, and to supply the Glasgow markets:—Take as much hellebore as would cover a penny, and mix it well in one gallon of water; syringe the bushes. When the weather is dry, the particles of hellebore will stick to the leaves, and the larvæ are poisoned at once on eating them. I have on several occasions entirely destroyed swarms of larvæ in twelve hours. If rain does not fall after this, the bushes should be syringed well with clean water.

The pupæ of the sawfly would no doubt be destroyed by the method recommended by Miss Ormerod, but it would be heavy labour when the grower has many acres of fruit trees. I therefore think it is desirable to exterminate as many in the larva-state as possible. I have never heard of any inconvenience caused by the use of hellebore in the manner I suggest. *Abraxas grossulariata* larvæ are most abundant in May, when the fruit is

small, and gives ample time for rain before picking; one heavy shower will wash every particle of hellebore from the leaves and fruit. If no rain, the syringing with clean water will prove effectual; at least that is my experience during the many years that I have used it.

If, however, there is any objection to the use of hellebore another remedy, perfectly harmless, is as follows:—Syringe the bushes with clean water, and when wet dust them with fine sifted coal-ash; it is advisable to throw this with the hand up under the foliage as much as possible, leaving a layer of an inch deep on the ground under the bushes. This is a west-country remedy, and is only effectual during dry weather.

JOHN N. STILL.

Broadleigh Down, near Tiverton, Oct. 26, 1891.

The use of hellebore in the way advocated by Major Still being new to us, we referred the matter to Miss Eleanor Ormerod, who has kindly written concerning it as follows:—

“I cannot at this minute recall any information being sent of the use of hellebore in fluid form (*i. e.*, as a syringing) as a means of destroying gooseberry caterpillars, but so long ago as 1879 I had notes of it as being exceedingly effectual if applied as a dry dusting. But also the effects on the eaters of the gooseberry fruit might be, and in one case were reported to have been, so extremely serious, in consequence of the fruit not being cleared of the poison before it was made into a tart, that I have been most careful as to bringing this remedy forward. I noticed it in the first edition of my ‘Manual,’ but with cautions. Of course, when applied in solution, such a much smaller amount is given that the risk is greatly lessened; still I do not like to have anything to do with recommending poisonous applications where there is risk of their remaining on either fruit or leafage to be used for consumption of man or farm-stock. There is no difficulty in keeping down gooseberry sawfly attack, if the surface soil is skimmed off during winter to the depth at which the little cocoons lie, and this infested soil is carried away and *destroyed*. This is a regular working gooseberry-grower’s remedy for the sawfly attack, and I should say that it would be just as serviceable (with a little adaptation) in getting rid of the caterpillars of the other gooseberry pest, the “magpie moth.” If the ground where they are wintering is removed, and an eye given to the bushes to remove such as may be hanging in their leaf-cradles, it makes a deal of difference in amount of attack.”

ELEANOR A. ORMEROD.

Torrington House, St. Albans.

NOTES ON THE SYNONYMY OF NOCTUID MOTHS.

BY ARTHUR G. BUTLER, F.L.S., F.Z.S., &c.

(Continued from p. 266.)

PYRRHIA, *Hübner*.*Pyrrhia umbra*.*Noctua umbra*, Hufnagel, Berl. M. iii. p. 294 (1767).*Pyrrhia exprimens*, Grote (not Walker), see Check List, p. 36, n. 97.

Europe, Dharmasala, United States. Coll. B. M.

Pyrrhia exprimens.*Heliothis exprimens*, Walker, Lep. Hist. xi. p. 687, n. 13 (1857).*Pyrrhia angulata*, Grote (see Check List, p. 36, n. 998).

United States. Coll. B. M.

Although it is just possible that the *P. exprimens* of Grote may prove to be locally worthy of being called var. *roseilimbata*, on account of the tint of the borders of the secondaries, the *P. exprimens* of Walker cannot, unfortunately, be distinguished from *P. angulata*.

SCHINIA, *Hübner*.

There is no possibility of rejecting this genus, as, even according to Grote himself, the three species associated by Hübner under *Schinia* are congeneric. I fail to see where the absurdity of its adoption in preference to *Lygranthæcia* comes in; moreover, Grote tells us that the *marginata* of Haworth is the type of his *Lygranthæcia*, in which case the latter genus will be a synonym of *Pyrrhia*.

Schinia trifascia.*Schinia trifascia*, Hübner, Zutr. Exot. Schmett. figs. 33, 34.*Anthophila lineata*, Walker, Lep. Het. xii. p. 830, n. 16 (1857).

United States. Coll. B. M.

Walker's description of the primaries is most eccentric. He calls these wings whitish, with four æneous bands; this description reversed would be more correct, the bronze colouring occupying the greater part of the surface.

I cannot comprehend the synonymy of "*Lygranthæcia*" *separata* as given in the Revised Check List, and which stands as follows:—

separata, Grt.Var. *acutilinea*, Grt.Var. *walsinghami*, Ed.Var. *balba*, Grt.

It appears to me just possible, though very improbable, that the first two may be forms of one, and the last two of a second,

species; the markings of *Schinia separata*, however, differ throughout from those of *S. acutilinea*. *S. walsinghami*, of which we have twelve examples from Lord Walsingham's collection, is a perfectly constant orange-tawny form, and stood alone in that collection; all the specimens were obtained at the "Sheep Rock." *S. balba* differs chiefly from the latter in its more olivaceous colouring and the white external border of primaries. No constant local form should be termed a variety.

ANARTA, Ochs.

Anarta richardsoni.

Hadena richardsoni, Curtis, Append. Ross. Narr. 2nd Voy. p. 72, pl. A, fig. 11.

Anarta septentrionis, Walker, Lep. Het. xi. p. 700, n. 10 (1857).

Lapland, Grinnell Land, Nova Zembla. Coll. B. M.

Under this species Walker placed specimens of a form with obscure markings and smoky secondaries, which I believe to be entirely distinct.

Anarta quieta.

Noctua quieta, Hübner, Eur. Schmett. Noct. fig. 485.

♂ *Anarta constricta*, Walker, Lep. Het. xi. p. 701 n. 11 (1857).

♀ *A. rigida*, Walker, l. c., n. 12 (1857).

Lapland, Finmark, Arctic America. Coll. B. M.

A. kellogii is nearly allied to *A. melanopa*, an example of which from California was in Grote's collection; it, however, appears to be distinct. *A. nivaria* is very close to *A. impingens*.

MELICLEPTRIA, Hübner.

I cannot think that my friend Grote has improved this genus in his Revised Check List by uniting *Adonisea* with it, or by turning *M. prorruppta* and *oregonica* into *Melaporphyria*; as to *M. oregonica* or *oregona* being synonymous with the European *Heliothis ononis*, it is quite out of the question. The resemblance between the two species, when examined side by side with an inch lens, is seen at once to be superficial; the pattern does not at all correspond, and the structure of the palpi differs considerably. "*Melicleptria*" *hoyi*, Grote (Check List, p. 36, n. 960), is "*Anarta*" *brephoides*, Walker (Lep. Het. xi. p. 702, n. 13); with the latter, Walker associated a species intermediate in pattern between *M. prorruppta* and *oregonica*, and bearing a label with the legend, "513 or 412. *Agarista simplicicornis*," but with no indication of locality. It is labelled in the same handwriting as one of the other five examples (= *M. hoyi*). The pectinated antennæ at once remove *M. hoyi* from *Melicleptria* to the neighbourhood of *Brephos*.

*ADISURA, Moore.**Adisura? moribunda.*

Leucania moribunda, Guenée, Noct. i. p. 95, n. 150.

L. invaria, Walker, Lep. Het. ix. p. 111, n. 78 (1856).

Sydney. Coll. B. M.

We have both type specimens of this species, so that *L. moribunda* is clearly proved to be from Australia.

I think *Heliothis lucilinea*, Walk., is best placed in this genus; it can hardly be a true *Heliothis*.

CURUBASA, Moore.

This genus, *Adisura* and *Pradatta* appear to me to be much confused. *Adisura* is evidently an offshoot from *Heliothis*, and has the same robust body, the general ground colour of pale *H. armigera*, the dusky border to the secondaries often showing a pale spot as in that genus. I would place under it *Leucania moribunda* and the allied *Pradatta artaxoides*. In *Curubasa* the body is less robust, the palpi are more slender, the wings are opaque and glossy, with rose-coloured costal and internal borders. In *Pradatta* the palpi are considerably shorter than in *Adisura*, the antennæ of the males much thicker in the type (though this difference does not hold with all the species), and the subcostal branches of the secondaries are emitted from an acute point, due to the strongly angulated discocellulars; the wings are almost as glossy as in *Curubasa*, and are longitudinally streaked with pale rose, after the manner of marking of a *Leucania*. Of the named species in the Museum I refer to *Curubasa*, in addition to the type (*C. beatrix*), *Leucania alaroides*, *Pradatta bimaculata*, *P. decorata*, and *Leucania aureola*.

Curubasa marginalis.

Anthophila marginalis, Walker, Lep. Het. xii. p. 830 (1857).

Adisura dulcis, Moore, P. Z. S. 1881, p. 368, pl. xxxvii. fig. 20.

Campbellpore. Coll. B. M.

In the type, which is faded, the cilia of the primaries are entirely pink, as in Moore's description of his *Adisura dulcis*, whereas in our Campbellpore specimen they are tipped with white. This appears to me to be probably a sexual character, but, even if not, I do not believe it to be of specific importance; and in any case Moore's *C. dulcis* is Walker's *A. marginalis*.

HELIODES, Guén.

It is impossible to guess by what method Dr. Staudinger has decided, to his own satisfaction, to fix the types of genera. His first action appears to be to ignore the author's typical species; his second action to substitute for it a species originally admitted, with hesitation, by the author into his genus. M. Guenée, when describing his genus *Heliodes*, indicates two

species, *rupicola* and *arbuti*, but says that he has never seen a specimen of the former; thus indicating the latter as his type. In his Nat. Hist. Lep. Noct. ii. p. 197, he distinctly marks *H. arbuti* as type of *Heliodes*, and omits *rupicola* from the genus. Dr. Staudinger takes the latter as type of *Heliodes*, and thus applies Guenée's generic name to a group for which it was not intended, with a type unknown to the author of the genus. Anything more opposed to practical common sense can hardly be imagined.

LEUCANIIDÆ.

Bityla, Walk.

I refer this genus to the group allied to *Nonagria*.

Bityla defigurata.

Xylina defigurata, Walker, Lep. Het. Suppl. 3, p. 756 (1865).

Bityla thoracica, Walker, l. c., p. 869 (1865).

New Zealand. Coll. B. M.

(To be continued).

ENTOMOLOGICAL NOTES, CAPTURES, &c.

RE-UNION BETWEEN THE SAME MOTHS.—Mr. J. N. Young's note on this subject (*ante*, 268) is of especial interest, following, as it does, so closely on a parallel case mentioned by Mr. Eustace R. Bankes (E. M. M. n. s. ii. 274), in which the species affected was *Ephestia kühniella*, and one exactly similar that came under my own notice in 1889, in which a bred male and female *Spilosoma mendica*, observed in cop. at 8 a.m. on May 25th, were found in the evening of that day to have separated, and ova to have been deposited, and on the following morning, at the same hour, they were again found paired, more ova ultimately resulting. But the question that these records suggest is whether a second act of pairing is frequent in wild Lepidoptera, and, in fact, necessary for the due fertilisation of the ova contained in the female? It was a saying with many of our older collectors that if you could take "a pair in cop." you were pretty sure of a "fresh female," which would appear to imply that only freshly-emerged females paired. But recent observation induces me to believe that this is by no means so, and as an instance I may mention the following:—During a brief stay at Eastbourne in August last I found *Lycæna corydon* very commonly, and among them a great many pairs in cop.; in some cases both male and female, and in others one or the other, were, without doubt, quite freshly emerged; but in a large number it was only too evident that both had been on the wing for a considerable time, and it is hardly to be supposed that with both sexes flying so commonly either would become worn before finding a mate.—R. ADKIN; Lewisham, November, 1891.

ABNORMAL EMERGENCE OF *DEMAs* *CORYLI*.—On looking over my breeding-cages yesterday, I was surprised to see in one of them a fine freshly-emerged female of *Demas coryli*. The larva from which it was reared

was received, with others, from the New Forest in August last; the batch fed well together, and they commenced to spin up on Sept. 6th, completing that operation by the 16th. Both larvæ and pupæ were kept out of doors. This species is, I believe, somewhat erratic in its times of appearance, a few larvæ in a brood sometimes feeding up more rapidly than their fellows in the spring, and producing imagines in August and September; but what can have induced this misguided creature to quit its pupa in this dull damp weather in the middle of November is beyond my comprehension.—ROBERT ADKIN; Lewisham, Nov. 16, 1891.

STAUROPIUS FAGI PARTIALLY DOUBLE-BROODED.—From ova of *Stauropius fagi*, placed in sleeves on oak and apple in June last, I have reared four imagines, the first emergence being on September 11th, the last on October 28th. In none of its stages had *fagi* been subjected to artificial heat. These facts have led to an outdoor search in its known haunts, with the result that three were taken during the week ended Saturday last.—J. CLARKE; Reading, November 9, 1891.

VARIATION OF ZYGÆNA FILIPENDULÆ.—Referring to your article on variation of *Z. filipendulæ*, I would say that the var. which I have named *cerinus* is not of very unfrequent occurrence here, and has been recorded more than once, I think. In some years several will be met with, and then it will not be seen for a long time. Another form also occurs here, in which the brilliant crimson of the spots and hind wings is replaced by a dull pinkish red. Of this form I have both bred and taken examples (Y. N. vii. 192), and in 1889 my friend Mr. Gardner bred four or five. I have two examples of the form with only five spots on the upper side, but they both have six on the under side.—JOHN E. ROBSON; Hartlepool, Oct. 7, 1891.

PSYCHE PULLA.—In answer to Mr. Briggs (Entom. 243), I should say that, as a rule, the larva of this species certainly does *not* hibernate full-fed; I have taken them in the spring, and had to feed them for over a month. My dates for the emergence of the perfect insect (this year) were June 22nd to July 22d, or thereabouts.—LOUIS B. PROUT; 12, Greenwood Road, Dalston, N.E., Oct. 10, 1891.

PRESERVING PUPÆ THROUGH THE WINTER.—As we have now reached a period when the ripest time for pupæ is just over, and are thinking of the best means by which they may be preserved, I can recommend a plan which I have myself tried for two years with very fair success, and, although it has probably been used by other entomologists, I have not heard of its being in general practice. My plan is this: get one of those improved larva breeding-cages, and, having taken away the sliding bottom, insert a piece of perforated zinc or wire gauze, lay the pupæ on this on damp moss, and fill the tins below with water; these, I may say, should be refilled once a month. In a cage such as this the pupæ may be kept in an ordinary living room, as the water by its evaporation will keep them from drying up, or emerging before the proper time.—J. LEWIS BONHOTE; Rev. W. D. Bushell's, Harrow, Nov. 8, 1891.

MATERIAL WANTED FOR PHYSIOLOGICAL INVESTIGATION.—I am very greatly in want of a number of dead pupæ and larvæ for a series of physiological investigations in which I am engaged, and shall be much indebted to any readers of the 'Entomologist' who will be kind enough to forward me

such material. Since presumably every one who breeds Lepidoptera has to reckon with a large percentage of mortality in his breeding-cages, and since it is quite indifferent to me *how common* the species may be, it seemed that by thus making known my wants I might obtain an abundant supply of material for the work in hand. I will only add a request that any larvæ or pupæ sent may be *named* as closely as possible: that, *e. g.*, if the species be unknown, the genus may be given; or, if even the genus be unknown, that the family be stated: but, above all, an incorrect or doubtfully correct naming should *emphatically* be avoided.—F. H. PERRY COSTE; Analytical Laboratory, 7, Fowkes Buildings, Great Tower Street, E.C., Nov. 16, 1891.

SOPHRONIA EMORTUALIS.—I have the specimen noted as sold at Stevens's (Entom. xxiii. p. 246). It was in Harper's collection. Locality said to be near Marlow, Bucks.—J. B. HODGKINSON; Ashton-on-Ribble, October 22, 1891.

VANESSA ANTIOPA AT BALHAM.—A friend informs me that on the 10th inst. a specimen of *Vanessa antiopa* was seen by the Rev. Dr. Edghill at Balham railway station, while he was waiting the arrival of a train. A good view of the insect was obtained as it flew the entire length of the station between the platforms and only a few feet above the rails, and passing close by him. I understand the Doctor is well acquainted with *V. antiopa*, as he has both seen and taken several on the continent. Curiously enough I saw one within 100 yards of the same spot in August, 1887, as recorded at the time.—F. W. FROHAWK; September, 1891.

NOTE ON *ACHERONTIA ATROPOS*.—On October 22nd I had a fine male specimen of *Acherontia atropos* brought to me, which had been found in a garden in Hastings Road, Maidstone. I had the pleasure of hearing the peculiar cry emitted by this insect several times. Once while setting it I heard the sound, but very faintly, when I moved the thorax, but as it was not repeated I could not ascertain from whence it came.—H. SANDLIN; 28, Hastings Road, Maidstone, November 3, 1891.

SPHINX CONVULVULI IN 1891:—

Kent.—On Monday, the 7th September, while mothing at a bed of sweet-scented tobacco-plant in my garden at Ramsgate, I captured two specimens of *Sphinx convolvuli*. I saw a third, but was unable to capture it, as I was engaged in bottling one. The two I caught proved to be a male and a female; the latter in good condition, but the male rather worn.—T. D. WILLSON; 22, Halford Road, Richmond, Surrey, Nov. 1891.

Lancashire.—On the 22nd of August I saw two *Sphinx convolvuli*, one of which I caught. It was hovering over the flowers of *Nicotiana affinis*. My brother has since seen several specimens, but failed to capture any.—G. A. BOOTH; Fern Hill, Grange-over-Sands, October 20, 1891.

Hants.—*Sphinx convolvuli* has been common here this season. I have taken ten specimens.—J. H. FOWLER; Pontner, Ringwood, Nov. 7, 1891.

DEILEPHILA LIVORNICA NEAR NORWICH.—A very fine specimen of *Deilephila livornica* has been brought to me for identification. The insect, which is in very fair condition, was taken by a collector in the early morning at rest near an electric-lamp, at Carrow, adjoining this city, early in September last. The specimen exceeds in expanse by a quarter of an inch that figured in 'Newman's British Moths.'—R. LADDIMAN; 25, Lower Hellesdon Road, Norwich, November 5, 1891.

DREPANA HARPAGULA (PLATYPTERYX SICULA) AT CLIFTON.—As I believe that *Platypteryx sicula* has not been recorded for several years past, I am pleased to note that the insect is still to be found, though rarely and with difficulty, in its old haunts in Leigh Woods, near Bristol. Mr. W. H. Grigg, the former captor of so many specimens, was good enough to accompany me to the locality on 12th September in search of the larvæ, and our afternoon's work resulted in four, three of which fell to Mr. Grigg's tray, but which he kindly presented to me. All of them fed-up well, and have pupated. A day or two after our capture, Mr. W. K. Mann obtained a larva from the same group of trees.—G. C. GRIFFITHS; 43, Caledonian Place, Clifton.

I am glad to be able to record taking a single larva of *Platypteryx sicula* [*Drepana harpagula*] on September 14th in Leigh Woods, Clifton. This species, although well worked for, has not been taken for four years.—W. K. MANN; Clifton, Bristol.

HELIOTHIS ARMIGER IN THE HASTINGS DISTRICT.—In July last I found a larva of this species on tomato. It changed to the pupa the same month; the moth emerged early in September, and was kindly determined by the Rev. E. N. Bloomfield, of Guestling.—H. W. FORD-LINDSAY; The Shrubbery, Clive Vale, Hastings, November 2, 1891.

CUCULLIA ABSINTHII IN DEVONSHIRE.—In reply to Mr. Bartlett (*ante*, 245), I beg to say that from 1874 to 1878 I used to take the larvæ of this species in the greatest abundance at Slapton Lea, and I have met with it elsewhere, both in South and North Devon, wherever its food-plant occurred, but never in such profusion as at Slapton.—GERVASE F. MATHEW; Lee House, Dovercourt, November 9, 1891.

ACHERONTIA ATROPOS AT GOSPORT.—Whilst collecting the other evening in a brick-field near Gosport, a scholar of St. Matthew's Boys' School, Gosport, captured a fine specimen of *Acherontia atropos*.—W. H. MACKETT; St. Matthew's School, Gosport, Oct. 12, 1891.

LARVÆ OF PHORODESMA SMARAGDARIA.—On Saturday, Sept. 12th, hearing that *Geometra* [*Phorodesma*] *smaragdaria* larvæ were to be found commonly, I went down with a friend to the Essex salt-marshes, and, though we had only a little over two hours to search, we succeeded in finding 53. I know of some 260 specimens that have been taken there this autumn.—R. E. JAMES; Chesterville, Hornsey Lane, N., Oct. 7, 1891.

LARVÆ OF APAMEA OPHIOGRAMMA IN NOTTINGHAM.—In my garden I took a number of larvæ of *Apamea ophiogramma* in September (kindly identified by Mr. South), feeding on ribbon-grass. They feed at night, creeping in the daytime down the hollow stems of the grass, or hiding near the ground. They buried in cocoa-fibre about October 14th, but had not changed ten days after, so may be hibernating. I believe that this is the first time the larva has been taken in the Midlands, but it may prove to be common when hunted for at the right time, as I have found it in two other gardens in the village.—DOUGLAS H. PEARSON; The College, Chilwell, Nottingham.

LARVÆ OF HADENA PISI.—With reference to the food-plant of this species (*ante*, pp. 245, 269), I do not think that it is very particular, but will feed on a variety of shrubs and low plants. Some years ago, in the

north of Devon, I found them in great numbers, feeding perfectly exposed upon foxglove, and I have seen them on hazel, bramble, broom, dock, knot-grass, and other plants. With regard to bracken, although I have frequently taken them upon it, stretched at full length enjoying a warm sun, I never found that they had much partiality for it as a food-plant in confinement, and used to consider that they had merely crawled up from some other plant. Last September I took several at Halifax, Nova Scotia, feeding upon alder and birch. — GERVASE F. MATHEW; Dovercourt, Nov. 9, 1891.

LARVÆ OF LARENTIA DIDYMATA.—At Instow, North Devon, I used to find the larvæ of this species in a shady lane, feeding upon the flowers of primrose; when the flowers were over they attacked the tender leaves, eating numerous holes in them. I never found them feeding upon anything else, although there was plenty of sorrel growing in the same lane. — GERVASE F. MATHEW. [See also p. 245.]

PUPATION OF ACRONYCTA ALNI.—With reference to Mr. T. B. Jeffreys note (Entom. 367), I may state it was my good fortune to take a larva of *Acronycta alni* at the foot of an elm, near here, on August 22nd. It was evidently full-fed, as it would not touch anything I placed in the cage for it to feed upon; and on the 30th, after appearing to sicken away, I was gratified to find it had pupated, and that without spinning any web at all. Probably it would have entered a stem for pupation had there been one large enough in the cage; but, being rather careless in this matter, I had not provided the accommodation. A friend of mine, Mr. T. L. Howe, also found a larva of *alni* in this district during the autumn, which acted and pupated exactly similarly to mine.—G. A. BIRKENHEAD; Downs View, Penarth, near Cardiff, November 10, 1891.

NOTES ON LEPIDOPTERA FROM VARIOUS LOCALITIES.—I took a single larva of *Aplecta occulta* this year on bog-myrtle in Inverness, and bred a very fine black form. I have done nothing very exceptional this year, but obtained a long series of *Sesia sphegiformis* from pupæ. Larvæ of *Notodonta dromedarius* I got not uncommonly on alder in Sligo, but they died off terribly; I also found there a male *Hydræcia nictitans* in cop. with female *Noctua xanthographa*. *Agrotis saucia* is appearing at sugar now rather freely, and the usual common lot in plenty. *Schænobius mucronellus* I took on a pond here, which may be of interest, as Stainton, I see, only gives the Fens as a locality.—JOHN E. EASTWOOD; Enton Lodge, Witley, Surrey, Oct. 13, 1891.

LEPIDOPTERA AT GAS LAMPS.—Some new gas-lamps here have proved very productive this season. In September *Ennomos tiliaria* were fairly plentiful and in good condition, and *Gortyna flavago* very plentiful. I also took *Trichiura cratægi* (two), which were new to me, *Scotosia dubitata*, *Cidaria testata* and *C. miata*, *Miselia oxyacanthæ*, *Hydræcia micacea*, &c. In October, *Tapinostola fulva*, *Oporabia dilutata*, *G. flavago*, &c. *Diloba cæruleocephala* and *Cheimatobia brumata* are now swarming.—DOUGLAS H. PEARSON; The College, Chilwell, Nottingham, Nov. 6, 1891.

LEPIDOPTERA IN THE NEW FOREST, 1891.—Saturday, May 30th, found me on my way to Brockenhurst, to join my cousin, Mr. Ogden, who had gone down there on the previous evening. The prospect in London was not promising, as the city was enveloped in a thick black fog the whole

morning. This, however, gradually disappeared as I got further on my way, and, on arriving, I was pleased to hear that the weather had been all that could be desired from an entomologist's point of view. This fine weather continued throughout the whole of our stay, with the exception of a heavy rainfall during the Thursday night, and a dull morning on the following Saturday. The weather being in our favour, we were able to make the most of our time, and were very fairly successful. The usual common spring butterflies, *Argynnis euphrosyne*, *Gonepteryx rhamni*, *Pyrarga egeria*, &c., were all very plentiful, with the exception of *Euchloë cardamines*, of which very few specimens were seen. *Argynnis selene* had not yet turned up, and *Thecla rubi* only occurred very sparingly, only six specimens in all being taken. *Nemeobius lucina* was exceedingly local, but plentiful where found; whilst *Hesperia malvæ* and *H. tages* turned up everywhere. Beating proved to be more successful than anything else, and by it we obtained, besides many other commoner things, *Ephyra punctaria*, *E. trilinearia*, *Corycia taminata* (local), *Halias prasinana*, *Lithosia aureola*, *Platypteryx falcata* and *P. lacertula* (both from birch), *P. hamula* (from birch and oak), and *P. unguicula* (from beech), all commonly; whilst *Ephyra pendularia*, *Episteria heparata*, and *Arctia mendica* occurred sparingly. *Bombyx rubi* was plentiful, though local on the heaths, and *Phytometra ænea* occurred everywhere, in company with *Fidonia atomaria*, and an occasional *Anarta myrtilli*, *Boarmia cinctaria*, *Nemoria viridata*, or *Euchelia jacobææ*. Male *Fidonia piniaria* and *Thera obeliscata* were taken abundantly among the pines by beating, or flying in the sun, and among them one *Macaria literata*. At Rhinefield, on June 5th, although the rhododendrons were not in flower, *Macroglossa fuciformis* was to be found fairly plentifully, and in good condition, at blossoms of American honeysuckle, clumps of which grow here and there in the enclosure. On the same day a *Macroglossa*, probably *bombyli-formis*, was seen over a patch of red rattle, in a glade of Stubby Copse. Captures at dusk were very few, but among them I might mention *Numeria pulveraria* and *Hypsipetes ruberata*. Besides the insects above mentioned, a nice fresh specimen of *Epione advenaria* was taken flying in the sun, and two *Lobophora hexapterata*, one of them on a water-pipe on Brockenhurst Station. Larva-beating resulted in *Catocala promissa*, *Liparis monacha*, *Halias quercana*, *Boarmia roboraria*, *Cleora lichenaria*, *Himera pennaria*, *Agriopsis aprilina*, and *Hemithea thymiaria*. Searching with a lantern after dark resulted in *Triphæna fimbria* larvæ, and in the daytime *Argynnis paphia*. On Saturday, June 6th, we returned home about midday, having had a most enjoyable visit, and very well satisfied with the results.—RUSSELL E. JAMES; Chesterville, Horusey Lane, N., Oct. 7, 1891.

SEVEN DAYS' LARVA-BEATING IN THE NEW FOREST.—Implement, the Bignell Beating Tray. Aug. 5th.—Larvæ: from oak, *Notodonta trepida* (1), *N. dodonæa* (3), *Stauropus fagi* (1), *Eurymene dolobrararia* (9), *Amphidasys betularia* (9), *Cidaria psitticata* (7), *Acronycta psi*, *Dasychira pudibunda*, *Odontoptera bidentata*, *Orgyia antiqua*, and other common larvæ in abundance; from beech, *Drepana unguicula* (2). Imago: *Calymnia trapezina* (2), out of oak. Aug. 6th.—Larvæ: from oak, *Tæniocampa instabilis* (2), *Boarmia roboraria* (1), *Tephrosia crepuscularia* (2), *S. fagi* (1), *N. dodonæa* (1), *Eugonia erosaria* (1), *E. dolobrararia*, *C. psitticata*, *A. betularia*, common. *Eugonia angularia*, pupa spun up in oak-leaves (came out Aug. 25th). Imago: *C. trapezina*. Aug. 7th.—Larvæ: from oak, *S. fagi* (1), *N. dodonæa* (3), *Acronycta alni* (1); from beech, *Demas coryli*

(6), *D. unguicula* (2); from birch, *Acronycta leporina* (1). Imagines: *Selenia illustraria* (male and female just out). Aug. 10th.—Larvæ: from oak, *N. dodonæa* (4), *Eugonia erosaria* (1), *Tephrosia biundularia* (1); from beech, *D. unguicula* (2), *D. coryli* (8); from birch, *A. leporina* (1), *Drepana falcula* (2); from pine, *Bupalus piniaria* (1). Imagines: *Lithosia griseola* var. *stramineola* (2), *Zonosoma punctaria* (1). *C. trapezina* (4), from trees; *Melanthia albicillata* (1), from nettles. Aug. 11th.—Larvæ: from oak, *A. alni* (1), *S. fagi* (1), *E. erosaria* (1). Aug. 12th.—Larvæ: from oak, *A. alni* (2), *S. fagi* (2), *Nola confusalis* (2); from beech, *D. unguicula* (2); from alder, *A. alni* (4); from birch, *Notodonta dromedarius* (8); from wild apple, *Bapta temerata* (1), *Smerinthus ocellatus* (1). Aug. 13th.—Larvæ: from beech, *N. dromedarius* (1). Imagines (over heath): *Selidosema plumaria* (4), *Eubolia palumbaria* (6). N.B. *E. dolobraria*, *C. psitticata*, *A. betularia*, *E. angularia* (larvæ) have been abundant throughout. I make no mention of the *Diurni* captured, as they were not my object. I took some seven *Limenitis sibylla*, stated by Newman to be uncommon in that locality; *Argynnis paphia* in numbers, and of the variety *valesina* I took two specimens, and saw a third; *Gonopteryx rhamni*, common; of *Vanessa io* I only took one specimen in beautiful condition, being too early for this brood. I got two curious varieties of *Pieris napi*, of which I hope to send figures later on. I also took *Hesperia thaumas (linea)* sparingly, one specimen of *H. comma*, and many others. On the heaths I took *Anarta myrtilli* in plenty, and also *Phytometra ænea*, one female (impregnated) *Bombyx quercus*, and *B. rubi* larvæ in abundance.—M. FITZGIBBON; Kilrock House, Howth, Ireland.

NOTES ON THE PAST SEASON: DELAMERE FOREST.—Notwithstanding the very cold spring, and the miserable weather we have experienced in this neighbourhood throughout the summer, and the consequent lateness of the season generally, I have found Delamere Forest fairly productive in 1891, especially for the autumnal species. A bad beginning was made with *Nyssia hispidaria* in March, only two males and one female falling to three pairs of eyes on two expeditions. I can thus quite endorse Mr. Arkle's remarks, in the June number of the 'Entomologist' (pp. 143, 144), as to the scarcity of the insect this year, and the difficulty of "timing" its appearance. The same remark applies to *Panolis (Trachea) piniperda*; it was "knocked out of time" by the inclement season. But the *Delamere piniperda* are certainly rather erratic; I have known one to have been taken in June. *Cymatophora duplaris* put in an appearance, and *Drepana falcataria (falcula)* was fairly common; whilst *Hepialus hectus* abounded, fluttering over the bracken in the early dusk. In June I also took two *Melanthia albicillata* for the first time in the Forest. *Aspilates strigillaria* seemed to be scarce and late, *Anarta myrtilli* plentiful, but most difficult to net. July produced *Aplecta nebulosa*, *Noctua festiva*, *N. baia*, black form of *Xylophasia monoglypha (polyodon)*, besides many other common species. August, I was away in Devonshire, but in September I returned to my "happy hunting ground," and took *Cloanthia solidaginis*, *Noctua glareosa*, *N. dahlia* (these three, together with *M. albicillata*, have not, I think, been recorded hitherto as occurring in the Forest), *Triphæna fimbria*, *Melanthia rubiginata*, *Xanthia fulvago (cerago)*, *Charæas graminis*, and numbers of others. Since September my sugar has attracted, among others, *Anchocelis rufina* (also unrecorded for the locality, I believe), *A. macilenta*, *Agriopis aprilina*, *Phlogophora meticulosa*, and *Himera pennaria*. *Cerastis vaccinii* has been very plentiful this year; some nights it simply swarmed, fifteen

to twenty being on one patch of sugar. I would like to record the abundance of autumnal larvæ in the Forest: *Notodonta dromedarius*, *Lophopteryx camelina*, *D. falcatoria*, *Hylophila prasinana*, *Hadena pisi* (which appeared to feed indiscriminately on half a dozen different plants), *Amphidasys betularia*, and various other kinds of "sticks," all in the utmost profusion. *Acronycta leporina* was rather scarce, but I succeeded in obtaining five. Comparing the past season with some previous ones, I do not consider that the year 1891 has been such a failure as the meteorological reports would have led one to expect. The abundance of larvæ seems to indicate that the weather has been less unfavourable for the hunted than for the hunter, and presages well for next year.—GEO. O. DAY; Old Bank, Sale.

NOTES FROM YARMOUTH.—The most noteworthy captures made by me during this year are as follows:—*Smerinthus tilia*, a specimen, the first one recorded from here, was taken in the Market Row, in July, where it was most probably attracted by the light. Two specimens of *Plusia festuca*, one of *P. iota*, a fine *O. sambucaria*, and a *Thecla quercus* from Reedham, and *Procris statices* from Hemsby. Referring to the last-named species, Messrs. Paget, in their 'Sketch of the Natural History of Yarmouth,' say of it, "common on the Caistor Marrams." As in the case of several other insects, *Procris* [*Ino*] *statices* does not occur there now. I also netted two *Mamestra albicollis*, one rather dark, at the shallows on Caistor Road. — J. E. KNIGHTS; 41, St. George's Road, Nov. 9, 1891.

THE SEASON IN NORTH NOTTS.—The results of my season's collecting here are by no means representative of the district's entomological resources, as, besides being absent during some of the best weeks of the summer, I made no attempt at sugaring after two futile expeditions in June, and did no collecting at all in Sherwood proper, confining my operations almost entirely to Clumber Park. Still, though I only worked in this partial manner, I met with several interesting species, the first of these being *Hepialus velleda*, of which I took a beautiful female variety about the middle of June. Next evening, while making my way to the locality where I had caught this one, I noticed a hedgerow swarming with "swifts," and, finding that they were of the right sort, remained on the spot, and took a number in a very short time. On the following night a regular expedition was organised, and *velleda* had an extremely bad quarter of an hour, during which time three of us secured about forty specimens, besides turning away many more. Some of the varieties were extremely beautiful, one especially, in which the ground colour was nearly black, the silvery markings standing out with fine effect. We also got several of the unicolorous variety *carnus*, and *Hepialus lupulinus* in evidence, but not so abundantly as *velleda*, while *humuli* and *hectus* only appeared occasionally. I found *Diurni* very scarce indeed, an occasional *Argynnis adippe* being all that relieved the monotony of "meadow browns," "cabbage whites," and "small tortoise-shells." I believe I once saw *Vanessa polychloros*, but could not make sure of it. Several species that have been taken here regularly for years, such as *Lycæna ægon*, *Argynnis selene*, *A. euphrosyne*, *Epinephele hyperanthus*, and *Vanessa atalanta*, did not appear at all, and I only saw one *V. io*. *Colias edusa*, of which odd specimens turn up pretty regularly in one locality, was also a failure, and the same may be said of *Gonepteryx rhamni*, which, however, is always rare here. The failure of *Diurni* induced me to devote the mornings to certain palings, and here again the unusual abundance of *Hepialidæ* was very apparent. In about half an hour I boxed thirty beautiful

specimens of *Hepialus hectus* off one fence, besides *H. velleda* ad nauseam. Of the latter species, I got one lovely specimen at rest on an oak, among the roots of which the empty pupa-case was lying. Other moths found at rest were *Aplecta nebulosa*, *Euplexia lucipara*, *Agrotis porphyrea*, *Ellophia fasciaria* (very small and dark), *Plusia iota*, *Acronycta psi*, *Polia chi*, one *Agrotis ravidæ*, *Xylophasia polyodon*, *Triphæna orbona*, *Melanippe ocellata*, and *Charæas graminis*. Nothing in the evening produced, in addition to the above, *Gonophora derasa*, *Noctua festiva*, *Agrotis segetum*, *Mamestra furva*, *Phlogophora meticulosa*, *Hadena dentina*, *Acronycta rumicis*, *Cosmia trapezina*, *Mania typica*, &c. Various species of *Cidaria*, including *C. fulvata*, were common, while some Geometers, especially *Boarmia rhomboidaria*, *Rumia cratægata*, and *Urapteryx sambucata*, were a positive nuisance. In June *Bupalus piniaria* was abundant in Clumber Park. It was very variable, and I got some smoky forms of the female, very like Scotch specimens in appearances. One female had the right wing pale brown and devoid of markings, the ground colour of all the other wings being the usual rusty orange. On the ground frequented by this species I saw numbers of larvæ of *Euchelia jacobææ* feeding on ragwort, but no imagines were taken this year, nor did I see *Euthemonia russula* or *Euclidia mi*, both formerly common in the same locality. *Epione apiciaria*, which I once took in plenty, did not appear, but *Venilia maculata* turned up once, and *Metrocampa margaritaria* was not uncommon. One *Eurymene dolobraria* was taken and another seen, and *Abraxas ulmata* reappeared after an absence of several years. Ten years ago this moth appeared here in myriads (I have seen six on one blade of grass); but, like the "clouded yellows" of 1877, it vanished as suddenly as it came, and until last July I did not meet with it again, and then only very rarely. One *Smerinthus populi*, a pair of *Platypteryx falcula*, a beautiful specimen of *Euperia fulvago* on Sept. 11th, and one each of *Odontoptera bidentata* and *Tephrosia crepuscularia* complete our list for 1891. — E. G. ALDERSON; Worksop, Notts.

A LEPIDOPTERIST'S NOTES FROM CHICHESTER.—Taking it altogether, this has been a wretched season here for Lepidoptera almost from the commencement. I think I never remember such an absence of Rhopalocera, even of the commonest species. The only capture of any consequence that I know of was a male of *Apatura iris* by the Rev. H. Housman. The specimen, in poor condition, was taken about a mile from the city, drinking at a little puddle in the road, late in July. In June I found *Phibalapteryx tersata* (common), *Larentia* [*Anticlea*] *rubidata* (one or two), and a few *Melanippe procellata*. In July *Uropteryx sambucata* was to be met with freely, with now and then *Geometra* (*Iodis*) *vernaria*. On the 13th of this month a larva of *Cucullia chamomillæ* was brought me by the gardener, feeding on chrysanthemums. As I saw it was likely to die, I helped it by converting the larva into a preserved specimen for my cabinet. During August I took a goodly number of *Acidalia emarginata* and *Cilix spinula* (*glauca*) from a hawthorn hedge. On 26th a specimen of *Sphinx convolvuli* was taken on a gate in one of the side streets here. On two or three evenings swarms of common Noctuæ, such as *Noctua xanthographa*, *Xylophasia monoglyphæ* (*polyodon*), and *Mania maura*, came to sugar, and amongst them *Agrotis puta*, *A. saucia* (1), and *Noctua plecta*. During September *Amphipyra pyramidea*, *Catocala nupta*, *Agrotis suffusa*, *Noctua c-nigrum*, *Anchocelis pistacina*, *Xanthia fulvago* (*cerago*), and one *Xylina petrificata*, from a sugared telegraph-pole, were amongst my captures. Visitors to light

included *Eupithecia succenturiata*, *Cidaria miata*, *Trichiura cratægi* (1), and *Diloba cæruleocephala* commonly. On Oct. 8th a male *Sphinx convolvuli* was taken. It is somewhat small, but the very fresh condition seems to suggest its having only recently emerged, a rather late date, if such be the case.—JOSEPH ANDERSON, JUN.; Chichester.

MACRO-LEPIDOPTERA COLLECTED FROM NORWICH GAS-LAMPS.—For some years past I have been in the habit of paying occasional visits, during the months of April, August, and September, to about seventy gas-lamps situated in the southern suburbs of the city of Norwich. They have yielded no less than eighty-two species of Macro-Lepidoptera, besides innumerable Tortrices and other Micros. Had I been able to work them systematically all the year round, I believe the number of species would have been at least doubled. I publish this necessarily imperfect list in the hope that it may prove useful to other collectors:—

Bombyces.—*Lithosia lurideola*, *Arctia caia*, *Porthesia similis*, *Leucoma salicis* (a single specimen), *Trichiura cratægi* (a single specimen), *Drepana binaria*, *Cilix glaucata*, *Pterostoma palpina* (two specimens), *Lophopteryx camolina*, *Notodonta dictæa*, *N. dictæoides* (a single specimen), *N. dromedarius* (a single specimen).

Noctuas.—*Bryophila perla*, *Acronycta aceris* (in June), *A. megacephala* (in June), *Leucania lithargyria*, *L. impura*, *L. pallens*, *Nonagria arundinis* (a single specimen), *Tapinostola fulva*, *Hydræcia nictitans*, *H. micacea*, *Neuronia popularis*, *Charæas graminis*, *Mamestra brassicæ*, *Agrotis segetum*, *Noctua augur*, *N. xanthographa*, *Triphæna orbona*, *T. pronuba*, *Amphipyra tragopogonis*, *Tæniocampa gothica*, *T. incerta*, *Anchocelis litura*, *Cerastis vaccinii*, *Xanthia citrigo* (a single specimen), *Calymnia trapezina*, *Dianthœcia cucubali* (a single specimen), *Polia flavicincta*, *Hadena pisi* (June), *Plusia gamma*, *Catocala sponsa*, *Xylina ornithopus*.

Geometers.—*Uropteryx sambucata*, *Epione apiciaria* (rare), *Selenia bilunaria*, *Crocallis elinguaris*, *Ennomos alniaria*, *E. erosaria*, *Biston hirtaria*, *Amphydasis strataria*, *Boarmia gemmaria*, *Ephyra punctaria*, *Acidalia imitaria*, *A. aversata* and var. *remutata*, *Cabera pusaria*, *Halia vaularia*, *Strenia clathrata*, *Abraxas grossulariata*, *Hybernica rupicapraris*, *H. leucophæaria*, *H. marginaria*, *H. defoliaria*, *Anisopteryx æscularia*, *Oporabia dilutata*, *Eupithecia oblongata*, *E. subfulvata*, *E. absynthiata*, *Hypsipetes sordidata*, *Melanthia bicolorata*, *Melanippe fluctuata*, *Anticlea berberata*, *Coremia ferrugata*, *C. unidentaria*, *Camptogramma bilineata*, *Cidaria siderata*, *C. miata*, *C. truncata*, *C. prunata*, *C. testata*, *Eubolia cervinata*, *Anaitis plagiata*. — E. W. CARLIER; 36, London Street, Edinburgh.

SIREX GIGAS AT NORWICH.—In July last a fine specimen of *Sirex gigas* was brought to me, which was caught near this city. This insect is of frequent occurrence here. — R. LADDIMAN; 25, Lower Hellesdon Road, Norwich, Nov. 5.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—Nov. 4th, 1891.—Dr. David Sharp, M.A., F.R.S., Vice-President, in the chair. Major John Nathaniel Still, of Seaton, Devon, and the Junior United Service Club, Charles Street, St. James's, S.W., was elected a Fellow of the Society. Mr. W. F.

Kirby exhibited a series of a very dark-coloured form of *Apis* reared by Mr. John Hewett, of Sheffield, from bees imported from Tunis, which he proposed to call "Punic Bees." They were larger than the black *Apis unicolor*, Latr., of Mauritius and Bourbon, and were almost entirely black, except in the legs, which were of a more or less reddish colour. Mr. C. G. Barrett exhibited five melanic specimens of *Aplecta nebulosa*, reared by Mr. Collins, of Warrington, from larvæ collected in Delamere Forest, Cheshire, and described by him, in the 'Proceedings of the Lancashire and Cheshire Natural History Society,' as *A. nebulosa*, var. *robsoni*, in honour of Mr. John E. Robson, of Hartlepool. Mr. Barrett also exhibited a beautiful variety of *Argynnis aglaia*, taken in Norfolk by Dr. F. D. Wheeler, and two specimens (male and female) of *Lycæna argiades*, taken in August, 1885, on Bloxworth Heath, Dorsetshire, by Mr. C. O. Pickard-Cambridge and Mr. A. Pickard-Cambridge respectively. Mr. H. St. John Donisthorpe exhibited a collection of Coleoptera, comprising about thirty-six species, made in a London granary in 1890 and 1891. The genera represented included *Sphodrus*, *Pristonychus*, *Calathus*, *Quedius*, *Creophilus*, *Omalium*, *Trogosita*, *Silvanus*, *Lathridius*, *Dermestes*, *Anthrenus*, *Corynetes*, *Ptinus*, *Niptus*, *Anobium*, *Blaps*, *Tenebrio*, *Calandra*, *Bruchus*, &c. Mr. A. B. Farn exhibited a series of specimens of *Eubolia lineolata*, bred from eggs laid by a specimen taken at Yarmouth. The series included several remarkable and beautiful varieties, and the size of the specimens was much above the average. The Rev. Dr. Walker exhibited specimens of *Argynnis ino*, *A. pales*, and *A. frigga*, from Norway. Mr. B. A. Bower exhibited, for Mr. J. Gardner, specimens of *Nephopteryx splendidella*, H.-S., *Botys lupulinalis*, Clk., and *Bryotopha obscurella*, Hein., taken at Hartlepool last June and August. Mr. R. Adkin exhibited two very dark specimens of *Peronea cristana*, from the New Forest. Colonel C. Swinhoe exhibited, and remarked on, types of genera and species of moths belonging to the Tineina, all of which had been described by the late Francis Walker, and placed by him amongst the Lithosidæ. Mr. H. Goss exhibited specimens of *Callimorpha hera*, taken in August last by Major-Gen. Carden in S. Devon, and observed that the species appeared to be becoming commoner in this country, as Gen. Carden had caught seventeen specimens in five days. Mr. Goss said that the object of the exhibition was to ascertain the opinion of the meeting as to the manner in which this species had been introduced into this country. A long discussion on this subject and on the geographical distribution of the species ensued, in which Mr. G. T. Baker, Mr. Stevens, Mr. Barrett, Colonel Swinhoe, Mr. M'Lachlan, Mr. Verrall, Capt. Elwes, Mr. Fenn, Mr. Jacoby, and others took part. Mr. C. J. Gahan contributed a paper entitled, "On South American species of Diabrotica: an Appendix to Part II." Mr. M'Lachlan contributed a paper entitled, "Descriptions of new species of holophthalmous Ascalaphidæ." Mr. W. L. Distant communicated a paper entitled, "Descriptions of four new species of the genus *Fulgora*." Mr. F. Enock read a paper entitled, "Additional notes and observations on the life-history of *Atypus piceus*." Every detail in the life-history of this spider was most elaborately illustrated by a large number of photographs, made by Mr. Enock from his original drawings, and shown by means of the oxy-hydrogen lantern. A discussion followed, in which Mr. C. O. Waterhouse, Dr. Sharp, Mr. G. C. Champion, the Rev. A. E. Eaton, Mr. P. Crowley, and others took part.—H. Goss, *Hon. Sec.*

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—
 Nov. 12, 1891. Mr. W. H. Tugwell, President, in the chair. Mr. Cooper exhibited a variety of *Abraxas grossulariata*, L., well banded, and without any trace of yellow in the markings of the wings. Mr. Auld, a hornet's nest from Ware, Hertford. Mr. West (Streatham), *Polia chi*, L., from the Lake District, one specimen being extremely dark. Mr. Herbert Williams, wine corks perforated by the larvæ of some insect; one of these larvæ was also exhibited: Mr. Williams stated that they were doing a considerable amount of damage to a city wine merchant's stock; the corks of over two hundred bottles of port (for which wine the species showed a decided preference) having been attacked. Mr. C. G. Barrett said he thought the larva was a half-grown specimen of *Ecophora pseudospretella*, Sta.; but it was very active, and might be the equally common *Endrosis fenestrella*, Scop. Mr. Adkin said he did not think either species confined their attention to port-wine corks, nor did he think the larvæ ever went through the cork into the wine. Mr. Forrester showed *Bombyx quercus*, L., var. *callunæ*, Palmer, from Perth. Some remarks were made with reference to this exhibit, in the course of which several instances were mentioned of full-fed larvæ of *B. quercus* having been taken in the autumn, at Folkestone and elsewhere. Mr. E. Joy, *Epinephale hyperanthes*, L., the variety *arete*, and others approaching it. Mr. C. G. Barrett, a variety of *Argynnis aglaia*, L., taken in Norfolk; two specimens of *Lycæna argiades*, taken on Bloxworth Heath in 1885; and specimens of *Aplecta nebulosa*, Hufn., reared by Mr. Collins, of Warrington, from Delamere Forest, and named by him var. *robsoni*. Mr. Tugwell exhibited some parasitic fungi, and remarked that it was one of the Entomophthoræ, a tribe of fungi parasitic on insects; he noticed this fungoid growth apparently growing from the soil in one of his breeding-cages in which eighty larvæ of *Eucosmia certata*, Hb., bred from ova, had pupated; the larvæ were fed on *Berberis vulgaris*; the fungi were half an inch or more high; on examination he found that all of the fungi sprung from the pupæ of *certata*, the whole of which were dead; some were enveloped in the fungus, but others were apparently healthy, but traces of white thread-like spots of the fungus were noticeable, and the pupæ were dead and could be snapped asunder like a damp rotten twig. Thinking that the germ of the fungus might have been introduced into the larvæ by the food-plant, Mr. Tugwell stated that he had placed some pupæ of *Gortyna flavago* in some of the same soil, and all those that were not on the point of emerging were killed by the fungus. Mr. Fenn said he had experienced the same thing in two or three cages. Messrs. Adkin, Carrington, West and others took part in the discussion which ensued. Mr. Adkin again exhibited the specimens of the *Tortrix* which Mr. Carpenter had named *donelana*, and remarked that he had been stated, in a report of a previous meeting, to have exhibited these specimens as *Tortrix steineriana* var. *dohriana*; he had, however, when exhibiting them, said he considered them to be *Tortrix viburnana*; he had now a specimen of the variety *dohriana* from Dr. Staudinger's collection. Mr. Tutt had brought his series of this variety which he had received from Herr Hoffmann; and Mr. C. G. Barrett had brought specimens of *T. steineriana* and examples of *T. viburnana* and its varieties. Mr. Barrett said he had been in correspondence with Mr. Carpenter on this subject, and was still of opinion that the specimens were simply *T. viburnana*; Mr. Carpenter had written to him, that although the larvæ fed on pine, one example had fed equally well on *Vaccinium*. Mr. Tutt said that in this part of the genus there were some six or eight

species very closely allied, and it was difficult to separate these after studying the variation among them, and he added that the figure published by Mr. Carpenter was undoubtedly *steineirana*; he did not for a moment suggest that Mr. Barrett was not right in calling the Irish specimens *viburnana*, but until more material was obtained he did not think it could be assumed they were distinct from the Continental *T. steineirana* var. *dohriana*. Mr. Barrett remarked that Mr. Carpenter's figure was from a single specimen, and was extremely unlike the majority of the specimens which had since been bred. Mr. Oldham exhibited, among other species, a black var. of *Cerastis spadicea*, Hb., from his garden, near Epping Forest, and a specimen of *Apamea ophiogramma*, Esp., taken in the Forest. Mr. South remarked that the first-named species should be called *ligula*, Esp., as it was not at all like Hübner's figure of *spadicea*.—H. W. BARKER, *Hon. Sec.*

LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY.—November 9th, 1891.—The President in the chair. The Secretary read letters from members of the South London Entomological Society, stating that Mr. Tutt's report of the proceedings of that Society (read at the last meeting) re *Tortrix donelana* was incorrect, and referred the members to their Secretary's report in the magazines for what actually took place. Mr. Robert Newstead, F.E.S., read a paper entitled, "General Notes on the Scale Insects, Coccidæ." The author gave a brief *resumé* of the work done by the earlier naturalists, and enumerated types of the principal genera (of which he had drawn large coloured diagrams in illustration). In the course of his remarks he described the distinctive characters, and exhibited drawings of the following new species:—*Lecanium assimilis*, on *Aster*, at Colwyn Bay; *L. minimum*, on *Areca* under glass, Cheshire; *Pulvinaria persicæ*, on peach, Cheshire; *Pseudococcus associatis*, on *Ribes*, Yorks; *Ripersia tomlinii*, on grass-roots in ants'-nests, Guernsey; *R. pulveraria*, under leaf-sheaths of *Agrostis*, Cheshire. Mr. Newstead exhibited specimens of 172 species of Coccidæ, including nearly all the known British species. Mr. Gardner exhibited *Coccus cacti* and *Carteria lacca*, the latter with their products. The Secretary, *Aspidiotus personatus*, *Vinsonia pulchella*, and *Lecanium oleæ*; the latter were much broken by some lepidopterous (?) larvæ, which had formed silken tunnels under the scales. The President exhibited melanic and other forms of *Liparis monacha*. Mr. Gregson, varieties of *Dianthæcia conspersa* and *Abraxas grossulariata*, bred by him this year. Mr. Walker, water-colour drawings of *Deilephila galii*; and Mr. Stott, a *Noctua*, previously exhibited some time ago, which had since been pronounced to be a variety of *Epunda lichenea* by Mr. Barrett.—F. N. PIERCE, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—Oct. 19th, 1891.—Mr. R. C. Bradley in the chair. Rev. C. F. Thornehill showed a number of insects taken on Cannock Chase this year, including a melanic variety of *Cymatophora duplaris*; also a collection made in Bucks this year, including *Cleora lichenaria*, *Boarmia roboraria*, *Adventia flexula*, *Phorodesma bajularia*, &c. Mr. G. W. Wynn showed a beautiful series of *Geometra papilionaria*, bred from Wyre Forest larvæ. Mr. P. W. Abbott showed *Setina irrorella*, *Agrotis lucerneæ*, and *A. lunigera*; long series from the Isle of Wight. Mr. R. C. Bradley showed *Acidia cognata* from Sutton, and *A. heraclei* from Moseley. Rev. C. F. Thornehill read notes on the recent discovery of

Stilbia anomala on Cannock Chase in abundance. Until last year it was not known to be a Midland insect, and then it was found by Messrs. Thorne-will and Freer in such numbers on the Chase that the latter took 150 specimens, and this year it was equally common.

Nov. 2nd.—Mr. R. C. Bradley in the chair.—Mr. Bradley showed *Gonyglossum wiedemanni* from Sutton. Mr. H. J. Sands showed *Calligenia miniata* from the New Forest. Mr. W. Harrison, a specimen of *Epione apiciaria*, taken at Harborne so late as Oct. 3rd this year. Mr. G. W. Wynn, *Nudaria mundana* from Cleeve Prior. Mr. C. J. Wainwright, insects bought at the Rev. G. H. Raynor's sale, including fine variable series of *Hypsipetes elutata*, *Cidaria russata*, &c., and specimens of *Eupithecia irriguata*, *E. subciliata*, &c. — COLBRAN J. WAINWRIGHT, Hon. Sec.

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REVIEWS.

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Photography applied to the Microscope. By F. W. MILLS. Small 8vo, pp. 62. London: Iliffe & Son. 1891.

To those wishing to become initiated into the mysteries of Photo-Micrography, we can recommend this cheap little practical guide. The opening chapter, which is written by Mr. T. Charters White, deals with the preparation of Microscopical Objects, and the necessity of perfectly flat mounting is insisted on. Chap. II. is devoted to a consideration of Microscopical Apparatus, and from this we learn that any one possessing a microscope with ordinary English objectives can add the necessary photographic requirements for general purposes at a cost of from £2 to £3. In Chap. III. advice is given on the Choice of Photo-Micrographic Apparatus, whilst in the remaining four chapters, the Dark Room and its Fittings, Exposure, Development, and Printing are dealt with, and full instructions given under each head. There is also a list of works on the subject.

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